

AI-assisted Building Model Reconstruction from Satellite-Based Point Clouds

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This research focuses on reconstructing 3D building models from point clouds produced with stereo pairs of high resolution optical satellite images. Deep learning techniques are applied to efficiently segment satellite images and point clouds, and to identify structures in order to facilitate the 3D reconstruction. In this study, U-Net semantic segmentation and PointNet++ 3D semantic segmentation are employed to process images and point clouds. They are used to automatically extract building footprints and point clouds from satellite data and complement each other in identifying building structures from the point clouds, addressing potential omissions in the identification process. The clustered building point clouds are then regularized and generalized to form more regular and uniform-shaped building polygons. Building height is determined based on point cloud data, and subsidiary structures are extracted subsequently, producing block-based 3D building models conforming to OGC CityGML LOD-1 specifications.

Keywords: Point cloud Segmentation, Semantic Segmentation, Deep Learning, 3D Building Model, Smart City Planning