Automatic Window Boundary Extraction from TLS Point Clouds

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3D city models are important for many purposes, such as urban planning, safety mapping, and so on. Initially, urban planning is generally limited to 2D design plans, which may difficult to interpret in detail. With the complexity of modern architectural designs of buildings, the interpretation further hampers. But with the development of computer technology, the reconstruction of 3D city models even in large cities is achievable though the automation is still a challenge. The traditional method of reconstructing 3D building is based primarily on manual reconstruction on top of 2D building footprints with the help of aerial images, or semi-automatic reconstruction from aerial images. The manual reconstruction of a city model is a rather time-consuming and costly process because of the huge number of urban features in a city and the variety of shapes. Typically, Terrestrial Laser Scanner (TLS) points contain useful information, and may be a valuable source of data to recreate 3D city models. The study introduces a new building facade feature extraction algorithm from TLS point clouds automatically. This is achieved by the recognition of object holes automatically from the point cloud automatically. The experiments results show that the automated building facade feature extraction algorithm, developed in this work, performs well with the 100% detection rate. The geometric accuracy of the extraction is greater than 5cm at the vertical wall surface in XZ axes. As such, it can be concluded that the developed approach could be easily applied for real projects in large cities.

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