EXTRACTION OF CHIMNEYS FROM LIDAR DATA USING WAVELET TRANSFORM

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ABSTRACT:

Nowadays 3D city modelling is very important and useful for many application such as urban planning, construction of the urban sceneries, cartography, surveillance, wireless network planning, entertainment, virtual tourism and so on. One of the most important objects in producing the 3D model of cities is buildings. 3D building model production is important step to create the city 3D model. LIDAR (Light Detection and Ranging) systems have many applications in generation of accurate DTM (digital terrain models) and surfaces models. Furthermore, LIDAR technology has good ability for collecting data over the massive areas like cities. So, using LIDAR data become more and more popular for creating 3D building models. Different level of details is needed for various applications in 3D cities. Consequently, more level of details should be provided for creating 3D building. The Sig3D group defines five levels of detail for multi-scale modelling: LOD0 – Regional model contains 2.5D Digital Terrain Model, LOD1 – Building block model without roof structures, LOD2 – Building model including roof structures, LOD3 – Building model including detailed architecture, LOD4 – Building model including interior model. Based on their definition for producing LOD3, superstructures like chimneys of roofs should to be added to building models. In this paper we use 2D wavelet transform technique to extract chimneys as one of the superstructures of building roofs. Multi-resolution analysis and also wide variety of base functions are the most important properties of wavelet transform that make it a powerful technique for extract level of details in LIDAR data. We use 2D wavelet transform techniques and connected component analysis for extracting chimneys from roofs LIDAR data. In comparison with aerial images, the results show in the most cases the chimneys was properly detected.

KEY WORDS: 3D building model, LIDAR, Level of details, Wavelet transform, Feature extraction