3D Modeling of Kanazawa City Center from Airborne LiDAR Data

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Abstract:

Recently, airborne laser scanning technology, known as LiDAR (Light Detection and Ranging), has become one of the most important tools in the surveying and mapping applications. It can provide a rapid and accurate collection of 3D positional data over an extended area. However, while 3D positional data is available, the 3D modeling process is not automatically done and it is still one of hot research topics. The needs of 3D city modeling are increasing in many projects dealing with virtual 3D city reconstruction. Such project examples are to develop a car navigation system with a capability of showing 3D city map, to generate images illustrating city environments with many sightseeing spots, to invite future visitors to a virtual city walkthrough for finding city's attractiveness, and so forth.

The main objective of this study is to find a practical procedure to make 3D modeling of urban area efficiently, using the airborne LiDAR data. In this study we selected Kanazawa city center as a case study area, which has large complicated buildings and forest areas including Kanazawa castle and Kenrokuen garden. The 3D city model of Kanazawa city center was generated, using the LiDAR point cloud data as basic information on building shapes and heights. Since the point cloud data provides little information on sides of the buildings, another resources are necessary for generating detailed 3D city model. In this study we used an orthorectified QuickBird imagery and photographic pictures of buildings. In the completion of the 3D city model a few softwares were utilized, such as LiDAR ANALYST for ArcGIS and AutoCAD Civil 3D. We found that automatic extraction results of building outlines were not always accurate from point cloud data and some adjustments were necessary. We found that AutoCAD Civil 3D were particularly useful in dealing with the point cloud data and building generation. Making use of importing and exporting capabilities from and into Google Earth, we successfully exported the 3D city model into Google Earth and a walkthrough simulation of 3D Kanazawa city center was demonstrated. Finally, we

clarified many merits and faults of software applications in the modeling process of Kanazawa city center.

Keyword: 3D City Modelling, Point Cloud, Google Earth