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TERRESTRIAL METHOD FOR AIRBORNE LIDAR QUALITY CONTROL AND ASSESSMENT

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ABSTRACT:

In the past decade, the Light Detection And Ranging (LiDAR) mapping technique has been an important tool for three dimensional point cloud data acquisition. Thus, the airborne LiDAR improves the ability to acquire direct geo-referencing data via GNSS/INS systems and have the ability to collect data over a wide area. However, in most cases the LiDAR footprints coordinate calculation is resulting from manipulated adjustment rather than from redundant measurements. Moreover, most of LiDAR systems do not provide the end user with the calibration and acquisition procedures that can use to validate the quality of the data acquired by the airborne system. Therefore, this system needs data Quality Control (QC) and assessment procedures in order to verify the accuracy of laser footprints and mainly at building edges. This research paper introduces an efficient method for validating the quality of the airborne LiDAR point clouds data using terrestrial laser scanning data integrated with edge detection technique. This method will be based on detecting the edge of building boundary from these two independent systems. Hence, the wavelet analysis technique will be used to detect edges from the airborne LiDAR using its ability to detect the positions of the sudden changes in the geometry and height. Nevertheless, wavelet has been used as a basis of Multi-Resolution Analysis (MRA) that analyzes a signal or image at many resolutions, which stand behind the wavelet filtering process. This technique assists the identification of building's boundary. Moreover, an automatic filter procedure will be used to filter the point cloud data acquired by the terrestrial laser scanning. Therefore, a new approach for edge detection will be introduced to detect the edges from the Terrestrial laser scanning. This approach will be based on the height and point density constraints. Therefore, a search window will be moving across the point cloud data. Then, the height and point density will be calculated for each window. Then, an estimated threshold value will be applied to each window in order to identify weather it belongs to building edges or not. The Hough transform method will be used to convert the windows, which are belonging to the building edges into vector edge segments. Finally, these point cloud, which are collected by both systems will be registered using the Iterative Closest Point (ICP) algorithm. Some statistical analysis and assessment will be implemented in order to compare these two systems in term of edge detection accuracy.

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