Quantitative Assessment of Structural Components for Construction Management Using Laser Scanning Data

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Key words: Deformation measurement; Engineering survey; Laser scanning

SUMMARY

A great achievement of laser scanning platforms allows to acquire three-dimensional (3D) topographic data of structures' surfaces in a construction site quickly and accurately. A current terrestrial laser scanner (TLS) can capture more than a million points per second with a sub-millimetre accuracy. This technology has been gradually implemented in evaluating progress, quality and quantity, and visualisation for construction management. However, a post-processing point cloud requires intensive labour work because of the complexity of the construction site and big data. The goal of the paper is to develop the algorithm to automatically access structural components for quality control of the construction project. The proposed method is focused to evaluate the flatness of the floors. First, the method starts to automatically extract the point clouds of the floors from the massive data points of the construction site acquired from a terrestrial laser scanner, which is done based on a combination of two-dimensional (2D) cell grids and a kernel density estimation based on z coordinates of the points within the cell. Additionally, to eliminate impact of the noise data to resulted flatness, a cell-based method is next proposed to measure the flatness of the floor. The proposed method is tested on a point cloud of the construction site acquired from the TLS and the performance of the method in term of an accuracy and executing time is also reported.