Shape Management Method of Large Structure Based on Octree Space Partitioning

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Abstract : The objective of the study is to construct the shape management method contributing to the safety of the large structure. In Korea, the research of the shape management is lack because of the new attempted technology. Terrestrial Laser Scanning (TLS) is used for measurements of large structures. TLS provides an efficient way to actively acquire accurate the point clouds of object surfaces or environments. The point clouds provide a basis for rapid modeling in the industrial automation, architecture, construction or maintenance of the civil infrastructures. TLS produce a huge amount of point clouds. Registration, Extraction and Visualization of data require the processing of a massive amount of scan data. The octree can be applied to the shape management of the large structure because the scan data is reduced in the size but, the data attributes are maintained. The octree space partitioning generates the voxel of 3D space, and the voxel is recursively subdivided into eight sub-voxels. The point cloud of scan data was converted to voxel and sampled. The experimental site is located at Sungkyunkwan University. The scanned structure is the steel-frame bridge. The used TLS is Leica ScanStation C10/C5. The scan data was condensed 92%, and the octree model was constructed with 2 millimeter in resolution. This study presents octree space partitioning for handling the point clouds. The basis is created by shape management of the large structures such as double-deck tunnel, building and bridge. The research will be expected to improve the efficiency of structural health monitoring and maintenance. "This work is financially supported by 'U-City Master and Doctor Course Grant Program' and the National Research Foundation of Korea(NRF) grant funded by the Korea government (MSIP) (NRF- 2015R1D1A1A01059291)."

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