

Bridge Members Segmentation Algorithm of Terrestrial Laser Scanner Point Clouds Using Fuzzy Clustering Method

Authors : Donghwan Lee, Gichun Cha, Jooyoung Park, Junkyeong Kim, Seunghee Park

Abstract : 3D shape models of the existing structure are required for many purposes such as safety and operation management. The traditional 3D modeling methods are based on manual or semi-automatic reconstruction from close-range images. It occasions great expense and time consuming. The Terrestrial Laser Scanner (TLS) is a common survey technique to measure quickly and accurately a 3D shape model. This TLS is used to a construction site and cultural heritage management. However there are many limits to process a TLS point cloud, because the raw point cloud is massive volume data. So the capability of carrying out useful analyses is also limited with unstructured 3-D point. Thus, segmentation becomes an essential step whenever grouping of points with common attributes is required. In this paper, members segmentation algorithm was presented to separate a raw point cloud which includes only 3D coordinates. This paper presents a clustering approach based on a fuzzy method for this objective. The Fuzzy C-Means (FCM) is reviewed and used in combination with a similarity-driven cluster merging method. It is applied to the point cloud acquired with Lecia Scan Station C10/C5 at the test bed. The test-bed was a bridge which connects between 1st and 2nd engineering building in Sungkyunkwan University in Korea. It is about 32m long and 2m wide. This bridge was used as pedestrian between two buildings. The 3D point cloud of the test-bed was constructed by a measurement of the TLS. This data was divided by segmentation algorithm for each member. Experimental analyses of the results from the proposed unsupervised segmentation process are shown to be promising. It can be processed to manage configuration each member, because of the segmentation process of point cloud.

Keywords : fuzzy c-means (FCM), point cloud, segmentation, terrestrial laser scanner (TLS)

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