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IDENTIFYING CORRESPONDING SEGMENTS FROM REPEATED SCAN DATA

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Abstract. It has been demonstrated that surface changes in the order of millimeters are detectable using terrestrial laser scanning. In practice however, it is still virtually impossible to detect such small changes from for example repeated scans of a complex industrial scene. The three main obstructions are, first, a priori uncertainty on what objects are actually changing, second, errors introduced by registration, and third, difficulties in the identification of identical object parts. In this paper we introduce a method enabling efficient identification that can also be applied to evaluate the quality of a registration. The method starts with a pair of co-registered point clouds, at least partially representing the same scene. First, both point clouds are segmented, according to a suited homogeneity criterion. Based on basically orientation and location, corresponding segment parts are identified, while lack of correspondence leads to the identification of either occlusions or large changes. For the corresponding segments, subtle changes at the millimeter level could be analyzed in a next step. An initial version of the new method is demonstrated on repeated scan data of a metro station experiencing heavy construction works.

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