ASSESSMENT AND COMPARISON OF REGISTRATION ALGORITHMS BETWEEN AERIAL IMAGES AND LASER POINT CLOUDS

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Photogrammetry, has been providing accurate coordinate measurements through the stereoscopic method for many years. LiDAR on the other hand, is becoming the prime method for large-scale acquisition of elevation data due to its capability of directly measuring 3D coordinates of a huge number of points. LiDAR can provide measurements in areas where traditional photogrammetric techniques encounter problems mainly due to occlusions or shadows. However LiDAR has also its limitations due to its inability of thematic information recording. The aim of this research is the optimum exploitation of both these elevation data sources. Usually this process is referred to as fusion of two datasets and exploits the advantages of both sources. The prerequisite step for the fusion of the two datasets is the co-registration. This paper describes a co-registration procedure, between the two datasets, that takes place through a 3D transformation. The performance of the algorithm A, which was presented in an earlier publication by the authors, and also an extended algorithm B based on the inclusion of the 7 transformation parameters, during the whole registration procedure, have been presented. Both algorithms developed based on the minimization of the distances between points of one surface to surface patches of the other surface, parallel to the corresponding surface normals. A comparison has also been performed between the results of the algorithms developed, in order to assess the geometric stability of the transformations, the analysis of the results, the effects on the registration and the accuracy of the derived parameters through stand-alone macros. Due to improved geometry of extended algorithm B an increased performance was expected. In fact the algorithm B converges 50% faster than the algorithm A. To support these tests a block of aerial images and a one month apart 3D laser point cloud were collected.