PERFORMANCE EVALUATION FOR AERIAL IMAGES AND AIRBORNE LASER ALTIMETRY DATA REGISTRATION PROCEDURES

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Photogrammetry is one of the traditional methods and sources of obtaining digital surface models (DSMs). Airborne Laser Altimetry (also widely known as LIDAR – Light Detection and Ranging), on the other hand, is a newer, highly automated, still improving and an accurate method providing coordinate measurements. The two methods deliver complementary surface information where the disadvantages of one method can be compensated by the advantages of the other method, if they are used together, in order to extend the range and the utilization of the information gathered due to the data fusion that can occur. This paper describes the accurate co-registration between the two data sets which takes place through a 3D transformation. This co-registration is the prerequisite step for the fusion of the two data sets. The theoretical framework of the algorithm which is presented is 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 as per the research of Schenk et al. (2000). In this research, the performance of this algorithm is evaluated on the sets which would be used to create the surface patches and on the processing levels of data sets. Moreover, the paper includes the description of the available data of the Espoonlahti area. The entire area is covered by a block of aerial images and a 3D laser point cloud taken in the same time period. Also, the results and the effects on registration using images and laser point cloud are described. The aims of the research were to investigate the geometric stability of the transformation, the analysis of the results, the effects on the registration and the accuracy of the derived parameters through an own developed and self-executable software script using real data and under real conditions.