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ANALYSIS OF MOBILE LASER SCANNING DATA AND MULTI-VIEW IMAGE RECONSTRUCTION

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Abstract. The combination of laser scanning (LS, active, direct 3D measurement of the object surface) and photogrammetry (high geometric and radiometric resolution) is widely applied for object reconstruction (e.g. architecture, topography, monitoring, archaeology). Usually the results are a coloured point cloud or a textured mesh. The geometry is typically generated from the laser scanning point cloud and the radiometric information is the result of image acquisition. In the last years, next to significant developments in static (terrestrial LS) and kinematic LS (airborne and mobile LS) hardware and software, research in computer vision and photogrammetry lead to advanced automated procedures in image orientation and image matching. These methods allow a highly automated generation of 3D geometry just based on image data. Founded on advanced feature detector techniques (like SIFT (Scale Invariant Feature Transform)) very robust techniques for image orientation were established (cf. Bundler). In a subsequent step, dense multi-view stereo reconstruction algorithms allow the generation of very dense 3D point clouds that represent the scene geometry (cf. Patch-based Multi-View Stereo (PMVS2)). Within this paper the usage of mobile laser scanning (MLS) and simultaneously acquired image data for an advanced integrated scene reconstruction is studied. For the analysis the geometry of a scene is generated by both techniques independently. Then, the paper focuses on the quality assessment of both techniques. This includes a quality analysis of the individual surface models and a comparison of the direct georeferencing of the images using positional and orientation data of the on board GNSS-INS system and the indirect georeferencing of the imagery by automatic image orientation. For the practical evaluation a dataset from an archaeological monument is utilised. Based on the gained knowledge a discussion of the results is provided and a future strategy for the integration of both techniques is proposed.

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