Suggested Topics: 5: Data Processing (High Resolution Data Processing / Change Detection).

Proposed Presenter: Armin GRUEN

Preference: Oral Presentation

QUALITYASSESSMENT OF IMAGE MATCHERS FOR DSM GENERATION - A COMPARATIVE STUDY BASED ON UAV IMAGES

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ABSTRACT: Recently developed automatic dense image matching algorithms are now being implemented for DSM (Digital Surface Model) /DTM (Digital Terrain Model) production, with their pixel-level surface generation capability offering the prospect of partially alleviating the need for manual and semi-automatic stereoscopic measurements. In this paper, several commercial/public software packages are evaluated for 3D surface generation from 5cm GSD UAV (Unmanned Aerial Vehicle) imagery. Generated surface models are assessed using point clouds generated from Mobile LiDAR (Light Detection and Ranging), as well as surveyed ground checkpoints and semi-automatic stereoscopic measurements. The software packages considered include APS (Menci Software), MICMAC, SURE, Pix4UAV and SGM from DLR (German Aerospace Center).

The evaluation is conducted on a typical urban scene of 354 m × 185 m, containing buildings, roads, variable terrain and vegetation. DSMs are initially generated by the different software packages and then co-registered to the ground reference data using Least Squares 3D surface matching, which minimizes the squared sum of the Euclidean differences between the matched DSM and the ground reference. The ground reference constitutes a manually measured DSM. The RMSE (Root Mean Square Errors), standard deviations and the error distributions (here in particular the analysis of blunders) are used for the evaluation of the matchers on both solid objects (buildings, road surfaces, bare earth, etc.) and 'soft' objects (trees, bushes, etc.). The analysis covers the full dataset, a version with solid objects only and finally one with buildings only. The results of the experiments give a useful indication as to which matcher performs best under the particular UAV imagery conditions.