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A comparison of semiglobal and local dense matching algorithms for surface reconstruction

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Abstract. Encouraged by the growing interest in automatic 3D image-based reconstruction, the development and improvement of robust stereo matching techniques is one of the most investigated research topic of the last years in photogrammetry and computer vision.

The paper is focused on the comparison of some stereo matching algorithms (local and global) which are very popular both in photogrammetry and computer vision. In particular, the Semi-Global Matching (SGM), which realizes a pixel-wise matching and relies on the application of consistency constraints during the matching cost aggregation, will be discussed.

The results of some tests performed on real and simulated stereo image datasets, evaluating in particular the accuracy of the obtained digital surface models, will be presented. Several algorithms and different implementation are considered in the comparison, using freeware software codes like MICMAC and OpenCV, commercial software (e.g. Agisoft PhotoScan) and proprietary codes implementing Least Square e Semi-Global Matching algorithms. The comparisons will also consider the completeness and the level of detail within fine structures, and the reliability and repeatability of the obtainable data.

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