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3D BUILDING CHANGE DETECTION USING HIGH RESOLUTION STEREO IMAGES AND A GIS DATABASE

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Abstract. In this paper, a workflow is proposed to detect 3D building changes in urban and sub-urban areas using high resolution stereoscopic satellite images of different epochs and a GIS database. Semi-global matching (SGM) is used to derive Digital Surface Models (DSM) and subsequently normalised digital surface models (nDSM, the difference of a DSM and a digital elevation model (DEM)), from the stereo pairs at each epoch. Large differences between the two DSMs are assumed to represent height changes. In order to reduce the effect of matching errors, heights in the nDSM of at least one epoch must also lie above a certain threshold in order to be considered as candidates for building change. A GIS database is used to check the existence of buildings at epoch 1. As a result of geometric discrepancies during data acquisition caused by different view directions and illumination conditions, the outlines of existing buildings do not necessarily match even in non-changed areas. Consequently, in the change map, there are streaking-shaped distortions along the building outlines which do not correspond to actual changes. To eliminate these effects a morphologic filter is applied. The mask we use operates as a threshold on the shape and size of detected new blobs and effectively removes small objects such as cars, small trees and salt and pepper noise. The results of the proposed algorithm using IKONOS and GeoEye images demonstrate its performance for detecting 3D building changes and to extract building boundaries.

[Conference Paper](#) (PDF, 961 KB)

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