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# Solving geometric co-registration problem of multi-spectral remote sensing imagery using SIFT-based features toward precise change detection

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## Abstract:

This paper proposes a robust fully automated method for geometric co-registration, and an accurate statistical based change detection technique for multi-temporal high-resolution satellite imagery. The proposed algorithm is based on four main steps: First, multi-spectral scale-invariant feature transform (M-SIFT) is used to extract a set of correspondence points in a pair, or multiple pairs, of images that are taken at different times and under different circumstances, then Random Sample Consensus (RANSAC) is used to remove the outlier set. To insure an accurate matching, uniqueness constrain in the correspondence is assumed. Second, the resulting inliers matched points is used to register the given images. Third, changes in registered images are identified using statistical analysis of image differences. Finally, Markov-Gibbs Random Field (MGRF) is used to model the spatial-contextual information contained in the resulting change mask. Experiments with generated synthetic multiband images, and LANDSAT5 Images, confirm the validity of the proposed algorithm.

## Keywords:

registration, SIFT, RANSAC, MGRF

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