

A Gabor Odd Filter-based Ratio Operator for SAR Image Matching

Sourabh Paul and Umesh Chandra Pati
Department of Electronics and Communication Engineering
National Institute of Technology, Rourkela, Odisha

Abstract

Synthetic aperture radar (SAR) image matching is a challenging issue in remote sensing as the images contain significant multiplicative speckle noise. Histogram of oriented gradients (HOG)-based descriptors have been used popularly for the matching of the SAR images. An appropriate gradient computation of the SAR images plays a significant role in the matching performance of these HOG-based descriptors. The ratio operators are preferred for computing the gradients in the SAR images as these are usually corrupted by the multiplicative noise. Recently, a multiscale Gabor odd filter-based ratio operator (GOFRO) has been proposed for the edge detection of the SAR images. In this letter, we utilize the GOFRO for SAR image matching. We propose a Gabor odd filter (GOF)-based descriptor, where the gradients are computed by the GOFRO. At first, scale-invariant feature transform (SIFT) features are extracted from the SAR images. A novel approach is presented to select the more repeatable SIFT features in SAR images. Then, the proposed GOF-based descriptor is formed for the SIFT features and, finally, feature matching is performed. Experiments on three sets of simulated and real SAR image pairs demonstrate the effectiveness of the proposed GOF-based descriptor for SAR image matching.

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