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Satellite image fusion using undecimated rotated wavelet transform

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Abstract

This paper presents two satellite image fusion algorithms namely decimated/subsampled rotated wavelet transform (SSRWT) and undecimated/non-subsampled rotated wavelet transform (NSRWT) using 2D rotated wavelet filters for extracting relevant and pragmatic information from MS and PAN images. Three major visual artefacts such as colour distortion, shifting effects and shift distortion are identified in the fused images obtained using SSRWT which are addressed by using NSRWT. The proposed NSRWT algorithm preserves spatial and spectral features of the source MS and PAN images resulting fused image with better fusion performance. The final fused image provides richer information (in terms of spatial and spectral quality) than that of the original input images. The experimental results strongly reveal that undecimated fusion algorithm (NSRWT) not only performs better than decimated fusion algorithm (SSRWT) but also improves spatial and spectral quality of the fused images.

Keywords

satellite image fusion, feature extraction, rotated wavelet filters, RWF, subsampled rotated wavelet transform, SSRWT, non-subsampled rotated wavelet transform, NSRWT, MS images, PAN images, shift distortion, shifting effect, fusion metrics

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