

Sampling Two-Channel Nonseparable Wavelets and Its Applications in Multispectral Image Fusion

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Abstract : In order to solve the problem of lower spatial resolution and block effect in the fusion method based on separable wavelet transform in the resulting fusion image, a new sampling mode based on multi-resolution analysis of two-channel non separable wavelet transform, whose dilation matrix is $[1,1;1,-1]$, is presented and a multispectral image fusion method based on this kind of sampling mode is proposed. Filter banks related to this kind of wavelet are constructed, and multiresolution decomposition of the intensity of the MS and panchromatic image are performed in the sampled mode using the constructed filter bank. The low- and high-frequency coefficients are fused by different fusion rules. The experiment results show that this method has good visual effect. The fusion performance has been noted to outperform the IHS fusion method, as well as, the fusion methods based on DWT, IHS-DWT, IHS-Contourlet transform, and IHS-Curvelet transform in preserving both spectral quality and high spatial resolution information. Furthermore, when compared with the fusion method based on nonsubsampling two-channel non separable wavelet, the proposed method has been observed to have higher spatial resolution and good global spectral information.

Keywords : image fusion, two-channel sampled nonseparable wavelets, multispectral image, panchromatic image

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