

Wavelet-Based SAR Images Despeckling Using Estimation Theory

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Abstract

In this paper, an improved speckle noise reduction method is presented based on wavelet transform. A 2D circularly symmetric Gaussian function is found to be the best model fitted to the speckle noise pattern cross-section in the logarithmically transformed noisy image [1]. Therefore, a Gaussian low pass filter using a trous algorithm has been used to decompose the logarithmically transformed image. The wavelet coefficients of the signal and noise are modeled using alpha-stable and Gaussian distribution functions, respectively. A Bayesian estimator is then applied to the wavelet coefficients based on these distribution functions as a priori information to estimate the best value for the noise-free signal. Quantitative and qualitative comparisons of the results obtained by the new method with the results achieved from the other speckle noise reduction techniques [2] demonstrated its higher performance for speckle reduction in SAR images.

References:

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