

SAR images noise-removal method using the stationary contourlet transform

[Ourabia, S.](#) ; Image Process. & Radiat. Lab., Houari Boumediene Univ. of Sci. & Technol. (USTHB), Algiers, Algeria ; [Boutarfa, S.](#) ; [Smara, Y.](#)

Synthetic Aperture Radar (SAR) images are strongly corrupted by the speckle noise due to random electromagnetic waves interference. The speckle noise reduces the quality of images and makes their interpretation and analysis really difficult, so it's necessary to filter images to remove the noise in order to preserve as much as possible the most important features of the signal. To achieve this goal, in this paper we present an efficient method that reduces the speckle noise in SAR images, based on the Contourlet Transform (CT). The CT is a new image decomposition scheme that provides sparse representation of the data, constructed by combining two successive stages, applying in first a Laplacian pyramidal decomposition followed by a directional filter bank. This non-linear approach is designed to give a good representation of the geometrical content of the image. Recently, the Stationary version of the Contourlet Transform (SCT) has been proposed to preserve the shift-invariant property. In the present paper, we explore two different de-noising methods: the Bayesian Shrinkage based on a weighting factor that reduces noise by using the contourlet coefficients, and the Soft Thresholding based on the choice of the threshold that ensures adaptation to the noiseless signals. Hence, we present a comparative study of the results obtained through the SCT considering different stages of decomposition's levels and different kind of filters, and the Lee Adaptive Filter. A performance evaluation is realized to validate our methods.

Published in:

[Systems, Signal Processing and their Applications \(WoSSPA\), 2013 8th International Workshop on](#)

Date of Conference:

12-15 May 2013

Page(s):

429 - 434