

Foucher, S. "SAR Image Filtering via Learned Dictionaries and Sparse Representations" In *Proceedings of the 2008 IEEE Geoscience and Remote Sensing Symposium (IGARSS2008)*. Boston, MA, USA, July 6-11, 2008

Abstract

In the last decade there has been a growing interest in the study of sparse representation of signals. In particular, many new multiscale image representations in a geometric space have been proposed (Curvelets, Ridgelets, Contourlets, etc.). Instead of using a fixed transformation, an alternative approach is to build a sparse dictionary from the signal itself. In the present work, we propose a novel approach for speckle noise reduction in SAR images using a sparse and redundant representation over trained dictionaries. In this approach, an adaptive dictionary composed of image patches (called atoms) is learned from the image so that it constitutes a sparse representation of the image content. This learning process, called K-SVD, is efficiently performed using an Orthogonal Matching Pursuit (OMP) and a Singular Value Decomposition (SVD). This new approach is effective in removing white additive Gaussian noise despite the fact that elements of the dictionary are learned from the noisy image, the algorithm is converging toward meaningful atoms that are already showing a reduction in noise level.

Keywords : K-SVD, speckle filtering, SAR