SMART REACH
(S/W CREATORS & TRAINERS)

Ph: 9585554590, 9585554599
Email: support@salemsmartreach.com
URL: www.salemsmartreach.com

Translation Invariant Directional Framelet Transform Combined With Gabor Filters for Image Denoising

Abstract:

This paper is devoted to the study of a directional lifting transform for wavelet frames. A nonsubsampled lifting structure is developed to maintain the translation invariance as it is an important property in imagedenoising. Then, the directionality of the lifting-based tight frame is explicitly discussed, followed by a specific translation invariant directional framelet transform (TIDFT). The TIDFT has two framelets ψ_1, ψ_2 with vanishing moments of order two and one respectively, which are able to detect singularities in a given direction set. It provides an efficient and sparse representation for images containing rich textures along with properties of fast implementation and perfect reconstruction. In addition, an adaptive block-wise orientation estimation method based on Gabor filters is presented instead of the conventional minimization of residuals. Furthermore, the TIDFT is utilized to exploit the capability of image denoising, incorporating the MAP estimator for multivariate exponential distribution. Consequently, the TIDFT is able to eliminate the noise effectively while preserving the textures simultaneously. Experimental results show that the TIDFT outperforms some other frame-based denoising methods, such as contourlet and shearlet, and is competitive to the state-of-the-art denoising approaches.