A New Approach to Image Denoising based on Wiener-LMMSE Scheme

Abstract

Several noise removal techniques have proven their worth in image processing applications. After an overview of some image denoising approaches, we introduce a LMMSE-based denoising technique with wavelet multiscale model and wiener filter in spatial domain. This proposed denoising technique stands out prominent in terms of SNR, MSE and PSNR compared to some more denoising techniques (also proposed in this paper). The Overcomplete Wavelet Expansion (OWE) which is also employed, provides better result compared to Orthogonal Wavelet Transform (OWT). Moreover, some fine details of the image such as edges, curves etc. is preserved using the LMMSE rule.

References

- Michel Misiti, Yves Misiti, Georges Oppenheim, Jean-Michel Poggi, "Wavelet Toolbox for use with MATLAB&\textsuperscript{\textregistered}; User\textapos;s guide, version 2. 1, pp. 1-37.
- N. G. Resmi, K. P. Soman, K. I. Ramachandran, "Insight into wavelets from theory to practice&\textsuperscript{\textregistered};, PHI, 3rd ed., New Delhi, 2011
- I. Pitas and A. N. Venetsanopoulos, "Nonlinear Digital Filters: Principles and
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    - J. Liu and P. Moulin, ?Information-theoretic analysis of interscale and intrascale
    - Lei Zhang, Paul Bao., ?Multiscale LMMSE-Based Image Denoising With Optimal
    - M. K. Mihçak, I. Kozintsev, K. Ramchandran, and P. Moulin, &quot;Low complexity
image denoising based on statistical modeling of wavelet coefficients,&quot; IEEE Signal
    - X. Li and M. Orchard, &quot;Spatially adaptive image denoising under overcomplete

Index Terms

Computer Science
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Keywords

Denoising Discrete Wavelet Transform (dwt) Wiener Filter Overcomplete Wavelet
Expansion (owe) Multiscale
Lmmse Mean
Square Error (mse)
And Peak Signal To Noise Ratio (psnr)