Current Issue
Browse Issues
Search
About this Journal
Instruction to Authors
Online Submission
Subscription
Contact Us
RSS Feed

Acta Medica Iranica
2009;47(4) : 8-13

"Platelet-based MPLE Algorithm for Denoising of SPECT Images: Phantom and Patient Study "

Abbas Takavar, HR Ghiasi, Naghmeh Alibabaei, Nader Riyahi-Alam , Armaghan Fard-Esfahani, Mehdi Sohrabi , Ahmad Bitarafan Rajabi

Abstract:

Introduction: In this study the evaluation of a Platelet-based Maximum Penalized Likelihood Estimation (MPLE) for denoising SPECT images was performed and compared with other denoising methods such as Wavelets or Butterworth filtration. Platelet-based MPLE factorization as a multiscale decomposition approach has been already proposed for better edges and surfaces representation due to Poisson noise and inherent smoothness of this kind of images. Methods: We applied this approach on both simulated and real SPECT images. Monte Carlo simulations were generated with the SIMSET package to model the physical processes and instrumentation used in emission imaging. Cardiac, brain and NEMA phantom SPECT images were obtained using a single-head, Argus model SPECT system. The performance of this method has been evaluated both qualitatively and quantitatively with power spectrum, SNR and noise level measurements on simulated and real SPECT images. Results: For NEMA phantom images, the measured noise levels before (Mb) and after (Ma) denoising with Platelet-based MPLE approach were Mb=2.1732, Ma=0.1399. In patient study for 32 cardiac SPECT images, the difference between noise level and SNR before and after the approach were (Mb=3.7607, SNRb=9.7762, Ma=0.7374, SNRa=41.0848) respectively. Thus the Coefficient of variance (C.V) of SNR values for denoised images with this algorithm as compared with Butterworth filter, (145/33%) was found. For 32 brain SPECT images the Coefficient Variance of SNR values, (196/17%) was obtained. Conclusion: Our results shows that, Platelet-based MPLE is a useful method for denoising SPECT images considering better homogenous image, improvements in SNR, better radioactive uptake in target organ and reduction of interfering activity from background radiation in comparison to that of other conventional denoising methods.

Keywords:

SPECT ، Platelets ، MPLE ، Denoising

TUMS ID: 3584

Full Text HTML Full Text PDF 360 KB

top