عنوان مقاله:

Quantitative Assessment of Conventional and Modern De-Noising on Nuclear Medicine Images

محل انتشار:

مجله فیزیک پزشکی ایران, دوره 3, شماره 1 (سال: 1385)

تعداد صفحات اصل مقاله: 10

نویسندگان:

Sh. Olumi - *M.SC. in Medical Physics, Tarbiat Modarres University, Tehran, Iran*

H. Rajabi - *Assistant Professor, Medical Physics Dept., Tarbiat Modarres University, Tehran, Iran*

S.R. Zakavi - *Associate Professor, Nuclear Medicine Dept., Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran*

E. Hajizade - *Associate Professor, Biostatistics Dept., Tarbiat Modarres University, Tehran, Iran*

خلاصه مقاله:

Introduction: One of the major problems in the development of nuclear medicine images is the presence of noise. The noise level in nuclear medicine images is usually reduced by the analysis of imaging data in a Fourier transform environment. The main drawback of this environment belongs to low signal to noise ratio in high frequencies because removing noise frequencies may remove data and times information as well. This problem becomes more serious when the most important signals are non-stationary. The aim of this research is to evaluate the effect of wavelet transform on nuclear medicine image. Materials and Methods: A brain phantom-like Hoffman phantom with 4 layers was used. Planar images were acquired from the phantom, with a total count of 107 (as reference image) and from each layer separately. The counts of planar images in each layer were increased from 100 to 700 kilo counts in seven steps. Different levels of white (Gaussian) noise was added to the reference images using MATLAB software. Simulation images using Simset software and NCAT phantom were also produced. Wavelet transform, Butterworth, Metz, Hanning(3*3) and Wiener filters were applied on all images. The Universal Image Quality Index (UIQI) was used to evaluate the image quality. Result: Wavelet transform can increase the value UIQI (UIQI = 0.7352). The effect of wavelet transform on the improvement of image quality is much better than Butterworth (UIQI = 0.3556) and Metz (UIQI = 0.3493) but almost the same as the effect of Wiener (UIQI = 0.7626) and Hanning (3*3) (UIQI = 0.8017). Discussion and Conclusion: Although wavelet transform is not the best method of reducing noise level, but its use can reduce the noise level like filters do. Assessment of commonly used thresholds as well as new design of a special threshold for wavelet transform in nuclear medicine images can improve the performance of this transform.

کلمات کلیدی:

Wavelet Transforms, Filtration, Noise Reduction, Nuclear Medicine