Application of analysis approach in Noise Estimation in Panoramic X-rays images using image processing program (MatLab)

Yousif Mohamed Yousif Abdallah*, Arwa Ahamed Almoustafa, Gehan Elhadi, Mamdouh Mohammed, Osman Khalafallah & Tayseer Khalid

Abstract:

This research presented an appropriate approach for the robust estimation of noise statistic in dental panoramic x-rays images. To achieve maximum image quality after denoising, a new, low order, local adaptive Gaussian Scale Mixture model is presented, which accomplishes nonlinearities from scattering. State of art methods use multi scale filtering of images to reduce the irrelevant part of information, based on generic estimation of noise. The usual assumption of a distribution of Gaussian and Poisson statistics only lead to overestimation of the noise variance in regions of low intensity (small photon counts), but to underestimation in regions of high intensity and therefore to non-optional results. The analysis approach is tested on 50 samples from a database of 50 panoramic X-rays images and the results are cross validated by medical experts. In this thesis, prominent constraints are firstly preservation of image's overall look; secondly preservation of the diagnostic content in the image and thirdly detection of small low contrast details in diagnostic content of the image. As shown in previously, state of the art methods provide nonconvincing results. The new approach is funded on an attempt to interpret the problem from the view of blind source separation (BSS), thus to see the panoramic image as a simple mixture of (unwanted) background information, diagnostic information and noise.

References:

1. Adelson, E.H., Bergen, J.R. 1991. "The plenoptic function and the elements of early vision", In Computation Models of Visual Processing, M. Landy and J.A. Movshon, eds., MIT Press, Cambridge, 1991, pp. 3-20.
2. Arvo, J., 1994, The Irradiance Jacobian for Partially Occluded Polyhedral Sources, Proc. ACM SIGGRAPH, ACM Press, pp. 335-342.
3. Yousif M.Y. Abdallah, 2010, Computed verification of Light and radiation Field Size on Coblat-60, Lambert Publisher Press, Germany, P.p. 34-66

4. Ball, J., Moore, A., 1997, Essential physics for radiographers, 3rd edition, Blackwell Scientific, Oxford.

5. Ball, J., Price, T., 1995, Chesney's radiographic imaging, 6th edition, Blackwell Scientific, Oxford.

6. Buehler, C., Bosse, M., McMillan, L., Gortler, S., Cohen, M., 2001, Unstructured Lumigraph rendering, Proc. ACM SIGGRAPH, ACM Press.

7. Farr, R., Allisy-Roberts, P., 1997, Physics for medical imaging, W.B. Saunders, London.

8. Fritsch D.S.; Chaney E.L.; McAuliffe M.J.; Raghavan S.; Boxwala A.; Earnhart J.R.D., 1995,International Journal of Radiation Oncology, Biology, Physics, Volume 32, Number 971, , pp. 217-217.

9. Georgiev, T., Zheng, C., Nayar, S., Curless, B., Salesin, D., Intwala, C., 2006, Spatio-angular Resolution Tradeoffs in Integral Photography, Proc. EGSR 2006.

10.Levoy, M., Ng, R., Adams, A., Footer, M., Horowitz, M., 2006, Light field microscopy", ACM Transactions on Graphics (Proc. SIGGRAPH), Vol. 25, No. 3.