

Evaluation of image quality for FPD based low dose mobile C-arm CT system

Saturday, 26 September 2015 19:52 (1 minute)

The imaging quality associated with the extent of the angle of gantry rotation, the number of projection views, and the dose of X-ray radiation was investigated in flat-panel detector (FPD) based C-arm cone-beam computed tomography (CBCT) system for medical applications. A prototype CBCT system for the projection acquisition used the X-ray tube (A-132, Varian inc.) having rhenium-tungsten molybdenum target and flat panel a-Si X-ray detector (PaxScan 4030CB, Varian inc.) having a 397 x 298 mm active area with 388 μm pixel pitch and 1024 x 768 pixels in 2 by 2 binning mode. The performance comparison of X-ray imaging quality was carried out using the Feldkamp, Davis, and Kress (FDK) reconstruction algorithm with different projection acquisition conditions.

In this work, head-and-dental (75kVp/20mA) and chest (90kVp/25mA) phantoms were used to evaluate the image quality. The 721 (30 fps \times 24 s) projection data during 360° gantry rotation with 0.5° interval for the 3D reconstruction were acquired. Parke weighting function were applied to handle redundant data and improve the reconstructed image quality in a mobile C-arm system with limited rotation angles. The reconstructed 3D images were investigated for comparison of qualitative image quality in terms of scan protocols (projection views, rotation angles and exposure dose). Furthermore, the performance evaluation in image quality will be investigated regarding X-ray dose and limited projection data for a FPD based mobile C-arm CBCT system.

[1] L. A. Feldkamp, L. C. Davis, and J. W. Kress, "Practical cone-beam algorithm," J. Opt. Soc. Am., vol. 1(A), no. 6, pp. 612-619, 1984.

[2] C.W. Seo, B.K. Cha, R.K. Kim, C.R. Kim, K. Yang, Y. huh, S. Jeon, "Development and Operation of a Prototype Cone-beam Computed Tomography system for X-ray Medical Imaging", J. Kor. Phy. Soc., vol. 64, no. 1, pp.129-134, 2014.

[3] D. L. Parker, "Optimal short scan convolution reconstruction for fan beam CT", Med. Phys., vol. 9, no. 2, pp. 254-257, 1982.

Primary author: Dr CHA, Bo Kyuyng (KERI)

Co-authors: Prof. SEO, ChangWoo (KERI); Dr JEON, Sungchae (KERI)

Presenter: Dr CHA, Bo Kyuyng (KERI)

Session Classification: After dinner POSTER session, with drinks: (All presenters are requested/encouraged to attend their posters; All participants are requested to participate the session, with drinks!)

Track Classification: Applications in Space, Medical, Biology, Material Sciences