

AbstractID: 1600 Title: A New Dose and Resolution Adaptive Filter

A new adaptive noise removal filter was devised for image enhancement. The filter utilizes pixel-wise nonlinear and adaptive techniques to estimate the additive noise power before filtering. The characteristics of the filter are adapted to the input X-ray flux and image spatial resolution. Filtering is minimal to the images that receive high X-ray flux, and increases with the decreasing flux. To minimize the loss of resolution, minimum filtering is applied to the area of an image with large variance to preserve the edges and other high frequency components of an image. One of the main applications of the dose adaptive filter is for CT systems in which the projection noise, after the logarithmic operation, increase quickly with the decrease in the measured photon signal.

The filter computes the local mean and variance around each pixel, determines the dominant noise (whether quantum noise or electronic noise), determines the open field mean and variance, and then applies pixel wise filtering.

This method of adaptive filtering reduces the image noise approximately by a factor of 2 with a resolution loss of less than 3%. This dramatically improves the image quality especially for low dose imaging applications such as mega voltage cone beam CT.

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