AbstractID: 11337 Title: Automatic detection of calcifications in cone beam breast CT images

Purpose:

Microcalcifications (MCs) play an important role in early detection of breast cancer. This study is to describe a technique to automatically identify and segment the calcifications from the breast anatomy in cone beam CT (CBCT) images.

Method and Materials:

Projection images of mastectomy breast specimens were acquired with a bench-top experimental CBCT system and reconstructed using FDK algorithm with a regular ramp filter. The reconstructed images were first corrected for the non-uniform cupping artifacts due to x-ray scatter and beam hardening. The corrected CBCT images had more uniform background but were still too noisy for threshold segmentation. To reduce the noise level, the images were processed with a noise averaging filter in z direction followed by a total variation filter to reduce the noise level while keeping the edge sharpness and contrast of calcifications. To automatically detect the calcifications with proper threshold level, a Gaussian curve fitting was used to fit the histogram of the CBCT image. Since the CT numbers of calcifications are usually significantly above those for breast tissue, cutoff point of the Gaussian curve was used as the threshold value to segment the calcifications.

Results:

With this method, the calcifications in the entire breast were successfully segmented from the breast tissue background. The results agreed well with those identified by visualization.

Conclusion:

The calcifications in CBCT breast images can be automatically detected by threshold based segmentation method with the nonuniform cupping artifacts corrected for and the noise level properly reduced.