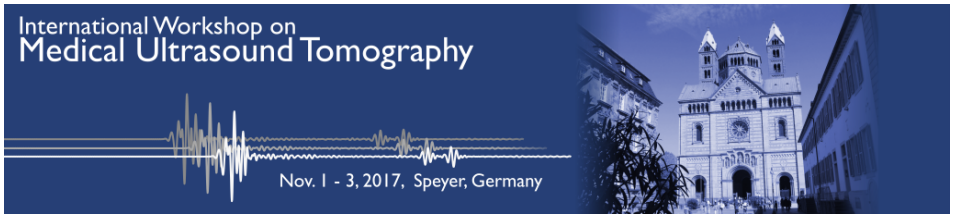

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Postprocessing workflow of 3D-USCT: bridging the gap to the clinic

Friday, November 3, 2017 11:00 AM (20 minutes)

As first USCT systems are approaching clinical application, it is an essential task to prepare the reconstructed images for intuitive diagnosis and conform to clinical standards. We describe our post-processing workflow consisting of automated breast segmentation, image fusion, DICOM export, our dedicated USCT DICOM viewer and the methods to transfer images to the clinic.

(2) Material and Methods

Automated breast segmentation is carried out by an active contour approach applied to reflectivity images. The binary segmentation mask can be applied to all three modalities as they are imaged in one step. To facilitate diagnosis we apply an image fusion, which color-codes sound speed and attenuation overlaid on reflectivity images. All three modalities are fused by applying thresholds on sound speed and attenuation. All images are thereafter exported into DICOM format with additional metadata. As in the DICOM standard currently no USCT SOP class is defined we apply the CT SOP class. Finally, images are transferred to a local installation of Conquest PACS and transferred to the clinic via tele radiology connection.

(3) Results

The segmentation was tested with 14 images resulting in an average surface distance of 2.7 mm from the manually segmented images. Modalities were fused applying empiric thresholds for sound speed (>1580 m/s to distinguish cancer from other tissue) and attenuation (0.1 dB/cm). The PACS installation was tested successfully and currently holds the data of our clinical studies. A tele radiology connection to University Medicine Mannheim was established based on the DICOM e-mail concept. The exported DICOM files were checked for consistency and tested with open source and commercial DICOM viewers as well as with our dedicated USCT DICOM viewer software, which allows convenient access and automated default display protocols.

(4) Discussion and Conclusion

We successfully established a fully automated post-processing workflow to bring 3D-USCT closer to clinical application. We consider segmentation and image fusion as essential steps for intuitive diagnosis which is focused to the most relevant clinical information. Using medical standards like DICOM and PACS allows easy integration into clinical workflows, yet in future we propose to extend the DICOM standard by a dedicated SOP class fulfilling the metadata requirements of USCT.

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