Abstract Title:	A probabilistic atlas of the lower extremity arterial tree for peripheral CT angiography
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Purpose: Segmentation and visualization of the peripheral arterial system from CT angiography (CTA) datasets is challenging. Due to the partial volume effect contrast medium-enhanced flow lumen, calcified and soft plaque as well as bone share similar density properties. Together with morphologic alterations of the vessel tree (occlusions, stents, collateral vessels) this prohibits the use of traditional data segmentation techniques unless extensive operator intervention is tolerated. It is our hypothesis that knowledge-based techniques, incorporating anatomical information about the skeleton and the normal vessel tree within a probabilistic atlas can help to significantly reduce the burden of manual editing.

Material and Methods: A probabilistic volumetric atlas is being built from clinical peripheral CTA datasets. Each data set is segmented in relevant tissues by manual and/or semiautomatic techniques and registered to a common coordinate system by means of a non-rigid three-dimensional registration technique. The necessary registration landmarks are specified manually. The atlas itself is obtained from the segmented and registered data sets by means of distance transforms and averaging.

Results: Preliminary results of this ongoing research indicate that it is possible to build probabilistic atlases of lower extremity anatomy by means of non-rigid data registration and to use them to support segmentation and tissue classification.

Conclusion: From our initial results it is hoped that probabilistic atlases of lower extremity vessels will provide sufficient apriori information for automated segmentation of unknown data sets in the future. Continuous, ongoing input of clinical datasets is required to improve the model properties.