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Automated image segmentation and registration of vessel wall MRI for quantitative assessment of carotid artery vessel wall dimensions and plaque composition

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Propositions

1. Automated segmentation of the vessel wall of the carotid artery using the 3D deformable tube model performs equally well as manual segmentation, but a bifurcation model is required to accurately segment bifurcating vessels. (*this thesis*)
 2. The effect of patient motion during scanning is considerable given the resolution of MRI vessel wall imaging and correction of this motion is required for accurate manual or automated segmentation of plaque components. (*this thesis*)
 3. Automated image registration can correct for patient motion during scanning and can therefore replace the manual alignment procedure. (*this thesis*)
 4. To advance both the manual and automated classification of plaque components, an improvement in MR image quality is required. (*this thesis*)
 5. It is a misconception that poor segmentation results due to low image quality can always be solved by image processing.
 6. To maximize applicability of a new image processing method, it should not operate on the raw pixel data, but on a coordinate system using physical dimensions in which the pixel data is defined.
 7. To facilitate development of image processing methods, it pays off the initial effort to set up a rapid prototyping tool, supporting scripting and visualization of intermediate results.
 8. If development of a fully automated tool requires 80% of the effort, an effective semi-automated tool can be developed in 20%.
 9. The ease with which a reviewer comments on the lack of a true gold standard (e.g. histology) is not in proportion to the effort required obtaining that gold standard.
 10. Inherent to a compulsory health insurance are regularized salaries in health-care.
 11. Life is 10% of what happens to you and 90% of how you react to it.
 12. It is a misconception that the lack of questions at the end of a lecture indicates a clear and comprehensible presentation. (*R. J. van der Geest, personal communication*)
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Automated Image Segmentation and Registration of Vessel Wall MRI for
Quantitative Assessment of Carotid Artery Vessel Wall Dimensions and Plaque
Composition

Ronald van 't Klooster, 2014