Quantitative Analysis of Coronary Artery from Computed Tomography Angiography Images

Automatic and accurate reconstruction of coronary arteries has been one of the aims of medical imaging, which is used to detect and quantify the potential stenosis. In this thesis, we first propose an automatic coronary artery segmentation approach based on Hessian filter and connected components. Secondly, a fast and robust technique for coronary centerline extraction is developed. The fast marching method is applied to calculate the time-crossing map. Then a branch tracking procedure based on the Runge-Kutta method is performed. Finally, an accurate and reproducible coronary artery cross sectional lumen area measurement algorithm at sub-voxel accuracy from CTA images is developed, which depends on centerline extraction and surface mesh generation. The application of this new framework is demonstrated on various CT images and the accuracy of the obtained lumen area is validated based on IVUS. This approach may garner wider clinical potential as a real-time coronary stenosis evaluation tool.

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Time: 10.00 AM
Venue: Conference Room, Level 2, SPMS
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