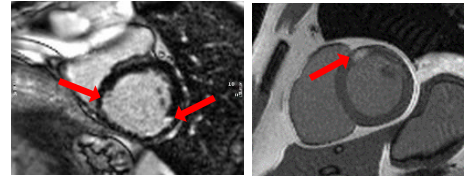


Internship / B.Sc. Thesis / M.Sc. Thesis

DL based scar quantification on contrast-enhanced cardiac MRI

Motivation

- Myocardial infarction can be detected using contrast-enhanced MR imaging of the cardiac muscle.
- Several techniques exist to achieve sufficient contrast between blood, healthy and diseased cardiac muscle.
- The manual segmentation and subsequent quantification of diseased muscle remains time-consuming and requires considerable expertise.
- The goal of this project is to evaluate methods to automate the post-processing of contrast-enhanced cardiac MRI to allow a standardized and fast diagnosis of myocardial infarction.



In-vivo (left) and simulated (right) LGE images. Red arrows indicate the scar.

Methods

The following work packages can be worked on independently. Depending on the type and length of the thesis, they can be combined:

- The potential of an existing MRI simulation framework will be further exploited to increase the resemblance between simulated and real images (heart motion, artefact levels, contrast mechanisms, ...)
- The phantom (virtual heart) will be improved to include features (motion, papillary muscles, ...) to increase the resemblance between in-vivo anatomy and phantom.
- Existing DL algorithms will be adapted and improved to investigate the advantage of using several other contrasts for myocardial segmentation and/or scar quantification.
- Different networks and improvements will be evaluated on unseen, annotated datasets from a clinical partner.
- The methods will be integrated into the scanner framework and tested for in-vivo imaging.

Requirements

- Programming skills (Python, C++)
- Machine Learning, Deep Learning
- Medical image processing

Advisors

Local: tbd

Siemens: Jens Wetzl, M.Sc., PD Daniel Giese, Ph.D.

Contact

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