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Extendable Multimodal Cardiac Analysis Framework

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Background and Objectives:

Diagnostic MR imaging in congenital heart diseases is utilizing increasingly multi-modalities in multi dimensions for assessment of anatomy, blood flow and tissue characterization. We present a novel cardiovascular imaging postprocessing framework (CAIPI) that integrates data into one comprehensive framework and provides open-access through an universally available web-front.

Methods and results:

For CAIPI we created a novel work-flow concept that uses strict 4D alignment and synchronization of image data. This does not only offer a synchronized visualisation of spatio-temporal relations of different datasets but also the combined analysis of different image types.

CAIPI provides a flexible biventricular volumetry tool that is fully independent of orientation and supports arbitrarily oriented views for interaction. Furthermore a flexible analysis tool for the myocardium is integrated, to segment and compare regions of interest in LE, T1, T2 and T2* maps. By the integrated workflow the results of multiple modalities can be combined such as perfusion MRI, late-gadolinium enhanced MRI, angiographies and 4D blood flow.

To provide easy access to the clinical research community CAIPI integrates the well known open-access web frontend Osirix. Complex image processing and visualisation are based on MeVisLab. Through plugin mechanism the software environment is easily extendible by image processing applications.

Conclusion:

We expect that the presented software platform will facilitate multi-modality multi-dimensional image processing in congenital heart diseases. The open-access architecture will make high quality software environment available to the user community. The plugin structure allows rapid integration of software prototypes from other research groups.