ICTGV reconstruction for accelerated Non-Cartesian DCE and quantitative MRI

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Dynamic Magnetic Resonance Imaging (dMRI) as subordinate concept contains many important applications such as CINE cardiac imaging, DCE MRI or time-resolved angiography but also MR parameter mapping such as the variable-flip-angle approach for T1 estimation. In order to speed up data acquisition or increase spatial and temporal resolution or spatial coverage MRI for these applications a reduced amount of data needs to be acquired and compensated for retrospectively within the reconstruction. Infimal Convolution of Total Generalized Variation Functionals (ICTGV) has recently been proposed as a sophisticated regularization functional for dynamic MRI applications[1]. This regularization technique allows for automatic balancing of locally different requirements of spatio-temporal regularization via infimal convolution leading to improved reconstruction quality.

While a first validation was carried out for classical dynamic applications such as CINE cardiac and cardiac perfusion imaging this contribution will focus on the application to the reconstruction of Non-Cartesian DCE data acquired with continuously updated golden-angle acquisition with subsampling ratios allowing for temporal-resolutions $< 1\ s$ for full liver coverage. Another application focuses on accelerated quantitative T1 mapping based on the variable-flip-angle method.

[1]Schloegl et al, MRM 2016, doi: 10.1002/mrm.26352