

Compressed Sensing in Cardiac Magnetic Resonance Imaging

Dr. rer. nat. Tobias Wech

Institute for Diagnostic and Interventional Radiology, University of Würzburg, Germany

wech.t@ukw.de

Abstract: Despite sophisticated treatment methods, cardiovascular diseases and their consequences still represent the main cause of death among both men and women worldwide. In order to further investigate the disease patterns and to optimize treatment, a detailed and exact analysis of the morphology, the function and the metabolism is indispensable. High field magnetic resonance imaging (MRI) has the potential to meet this need both in clinical routine as well as in preclinical research.

However, there is still a need for improvement in both fields. Clinical cardiac MRI represents a sophisticated procedure featuring long scan times. This renders the examination comparatively expensive. In preclinical imaging of small animals, long scan times have to be accepted to obtain the required high spatial and temporal resolution. Fast imaging is thus essential for an effective application of cardiac MRI in large collectives. Besides the improvement of the scanner hardware and the optimization of imaging sequences, procedures to accelerate MR data acquisition by exploiting information theory represented one of the major research fields of the last decade. While numerous publications were associated with parallel imaging (PI, [1, 2]) at the beginning of this millennium, the compressed sensing theory (CS, [3, 4]) recently gained more and more interest. As MRI is perfectly qualified for an application of CS [5], numerous publications already report on dedicated research.

This talk will give an overview of methods exploiting the concept of compressed sensing in both clinical and preclinical cardiac magnetic resonance imaging.

- [1] Pruessmann et al., MRM 42(5):952-962(1999). [2] Griswold et al., MRM 47(6):1202-1210(2002). [3] Donoho, IEEE Transactions on 52(4):1289-1306(2006). [4] Candès et al., IEEE Transactions on 52(2):489-509(2006). [5] Lustig et al., MRM 58(6):1182-1195(2007).