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SPARSE SAMPLING FOR SPARSE MAGNETIC RESONANCE IMAGING

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Summary: Several medical imaging techniques, especially regarding Magnetic Resonance Imaging (MRI), require to accelerate data acquisition for allowing the measurement of very fast physiological dynamic processes. Experimental data are collected in the k-space by following different trajectories to cover the whole space. Complete data acquisition necessitates waiting for a fixed and long temporal interval: the sparsity which is implicit in MRI images can be traduced in some under-sampling. Compressed Sensing (CS) allows to recover images from randomly sampled under-sampled k-space data and non-linear optimization for reconstruction. We discuss the possibility of improving further image quality and/or acquisition time reduction by using adaptive acquisition methods, for collecting an under-sampled dataset consisting of "the most informative" k-space data, and non-linear reconstruction. In this way, the collected dataset is supposed to be almost minimal, adapted to the sample shape, and, at the same time, apparently random. The goal is to get advantage both from the adaptive acquisition and from non-linear reconstruction methods used in classical CS. Comparisons between classical CS and adaptive CS are reported and discussed.