Keynote Lecture

Sampling Less and Reconstructing More for Magnetic Resonance Imaging

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Abstract. Magnetic Resonance Imaging (MRI) is one of the modalities for medical imaging with the fastest growth in recent years. The rapid adoption of MRI is explained by its high soft tissue sensitivity, unprecedentely high resolution and contrast for some anatomies, wide variety of contrast mechanism and functionality, high geometric flexibility, and lastly because of its innocuousness. Nevertheless there are several issues that remains challenging the scientific community. These are typically related to two linked characteristics: high cost (investment and operation) and long scans, particularly for dynamic imaging. One of the promising approachs currently investigated for reducing the scan time is under-sampling. This is a fascinating area of research in which the Nyquist sampling theorem is defied: the data is scarcely sampled in the Fourier domain and later on, reconstructed with a minimum of artefacts (aliasing, for instance). This talk will review some of the techniques currently proposed which are at different stages of applicability such as partial Fourier and key-hole, kt-BLAST, UNFOLD, Obels and Compressed Sensing. All of these employed some kind of a-priori knowledge to reconstruct fairly high quality images from data under-sampled by factors of 4, 16 and more.

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