

Compressive Sensing for Magnetic Resonance Imaging

Exercise Sheet 2

Unfortunately, no one can be told what the Matrix is. You have to see it for yourself.

- 1 State rigorously and prove the “Fourier Slice Theorem”. Give its interpretation and explain its connection with MRI
- 2 Write, in Julia, a software that simulates the reconstruction from “Standard sequential Cartesian filling of k-space with left-to-right frequency-encoding”, “Centric ordering of k-space acquisition” and the “Outward radial ordering of k-space” from <http://mriquestions.com/k-space-trajectories.html>
- 3 What is the difference between synthesis sparse models and analysis sparse models? Why the analysis sparse models are harder to analyze? Check the paper “analysis versus synthesis in signal priors” by Elad, Milanfar and Rubinstein.
- 4 What is the different between cartesian Fourier transform and non-cartesian Fourier transform? How to use NFFT in Julia?
- 5 What is a spin echo imaging? What is a gradient echo imaging? What are the advantages and disadvantages of both?