Seminar

Friday 25 November 2016
15h30 – 17h00
UT3 Paul Sabatier, IRIT, Salle 001

BESSON A., THIRAN J-P
Ecole Polytechnique Fédérale de Lausanne, LTS5 (Suisse)

Recent works on Compressed Ultrasound beamforming and brain connectivity analysis by diffusion MRI imaging at EPFL

Abstract: This talk will present two recent pieces of work dveloped in our lab in medical imaging. The first one is related to ultrasound imaging. Classical ultrasound (US) image reconstruction mainly relies on the well-known Delay-And-Sum (DAS) beamforming for its simplicity and real-time capability. However, DAS requires an extensive number of samples and delay calculations to obtain high-quality images. Compressed ultrasound beamforming (CUB) proposes an alternative to DAS based on the compressed-sensing (CS) framework which aims at reducing the data rate. CS demonstrates that a signal can be perfectly recovered from fewer samples than required by the Nyquist rate if some properties of both the signals under interest and the acquisition system are respected. In order to account for these properties, CUB redesigns both the acquisition and the reconstruction of US images and leads to high quality reconstruction with less than 20% of the data required by DAS. In the talk, some basic principles of CS and US will be introduced. Then, we will describe CUB in light of the CS framework introduced before. Eventually, benefits of CUB will be demonstrated through simulation and in vivo experiments.

The second part of the talk will discuss our recent works in brain connectivity analysis by diffusion MRI. After a short introduction, we will present our convex optimization framework to robustly estimate brain connectivity and microstructure information from diffusion MRI, in the context of Connectomics. Clinical applications will be presented and remaining challenges will be discussed.

05 61 55 65 10
info@irit.fr

www.irit.fr