Master internship position 2016

## Implementation of a spinal cord MRI image quality assurance pipeline

<u>Supervisors</u>: Emmanuel Caruyer (emmanuel.caruyer@irisa.fr), Elise Bannier (elise.bannier@irisa.fr), Anne Kerbrat (anne.kerbrat@chu-rennes.fr)

<u>Location</u>: Unité/Projet VisAGeS, IRISA, Campus de Beaulieu, 35042 Rennes Cedex, France
http://www.irisa.fr/visages

<u>Duration</u>: 5 to 6 months, starting between February and April 2016

Context

VisAGeS U746 is a research team from Rennes 1 University, jointly affiliated with Inserm and Inria. It is also part of the IRISA (UMR CNRS 6074) and is located in Rennes, France on both medical and science campuses. The objective of the team is to work jointly with clinicians, radiologists from the university hospital to propose new advances in medical image processing. Among others, the team in involved in multiple sclerosis (MS) image processing studies, in close collaborations with neurologists and radiologists. MS is a frequent neurological, inflammatory and demyelinizing, disease affecting young adults. An ongoing national longitudinal multicenter study lead by Rennes is investigating the link between spinal cord MR imaging and ambulatory disabilities (EMISEP). To date, most of the many MRI studies have focused on brain MRI but interest in spinal cord MRI is growing. Advanced spinal cord MR imaging remains challenging due to the small volume of the cord as well as to respiratory and cardiac motion. Several sequences are acquired, as part of the EMISEP imaging protocol, to visualize focal lesions, evaluate spinal cord volume or diffuse lesions using diffusion and magnetisation transfer imaging. Beyond visual assessment, a more thorough assessment of image quality is required, preceeding image processing.
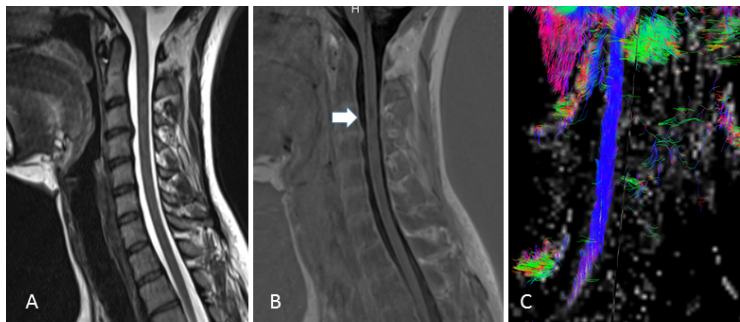
Figure 1 : example images acquired in the EMISEP study.
Focal Lesions: T2 TSE (A) and PSIR (B). Diffusion imaging (C)

Internship objectives

The student will take part in a literature review of image quality assurance methods. He/She will then implement the selected methods for generic (noise estimation, motion, artifacts) and EMISEP spinal cord MRI specific assessment of image quality.

Location

This internship will take place at Inria/IRISA, UMR CNRS 6074, among the VisAGeS U746 research team. The work will be conducted in close link with the MRI experimental platform at Neurinfo (http://www.neurinfo.org) as well and the neurologists and radiologists involved in the project.

Keywords : Software development, quality assurance, image processing, MRI

Requirements : strong knowledge in image processing and programming: python, C++, ITK. Knowledge of MRI acquisition techniques will be appreciated.