Scheda di Offerta Tesi

Titolo (provvisorio): Diffusion Kurtosis Imaging in pediatric data

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Motivazione e campo di applicazione

Diffusion-weighted magnetic resonance (DWMR) imaging is an important tool to investigate the structure of brain tissue in vivo and noninvasively. This kind of imaging analyzes white matter fiber pathways in the brain by mapping the motion of water molecules along the fibers. Several techniques exist in order to derive different kinds of information from this analysis: it is possible to study white matter integrity, structure, connectivity between brain regions in healthy or pathological subjects.

Obiettivi generali e principali attività

One of these techniques is Diffusion Kurtosis Imaging, which investigates how much water diffusion in brain tissues differs from Gaussian diffusion. This type of analysis is difficult to apply on images of children and neonates, because of the immaturity of the neonate brain and the specific sequences needed for these subjects.

Obiettivi

- study different tools and methods of computing Diffusion Kurtosis on DW-MR images
- select best tool for kurtosis analysis and test feasibility on images of children and neonates
- determine processing pipeline comprising preprocessing steps, selection of best parameters and postprocessing steps for kurtosis analysis in pediatric data

Obiettivi di apprendimento (strumenti tecnici e analitici, metodologie sperimentali)

- learn to integrate image analysis software (FSL, Mrtrix, FreeSurfer) to create a pipeline
- develop processing pipeline in Python/bash scripting
- learn to analyze DW-MR images

Luogo/i in cui si svolgerà il lavoro: Biolab (Unige) - Gaslini

Informazioni aggiuntive

Abilità e capacità richieste: Programming in Python/bash scripting; […]

Numero massimo di studenti: 1