Stage de master - How does the shape of the hippocampus affect automatic segmentation ?

<u>Encadrants</u> : Claire Cury, Empenn team, Inria : claire.cury@inria.fr, Pierre-Yves Jonin, CHU Rennes : pierreyves.jonin@chu-rennes.fr

<u>Lieu du stage</u> : Unité/Projet Empenn, IRISA-Inria, Campus de Beaulieu, 35042 Rennes Cedex, France https://team.inria.fr/empenn

<u>Durée</u> : 5 à 6 mois, démarrage en 2022

<u>Mots-clés</u> : Hippocampus, automatic segmentation, 3D shapes

Context :

The hippocampus is a bilateral brain structure of the temporal lobe which is implicated in memory processes, spatial navigation and in various pathologies such as Alzheimer's disease, epilepsy, depression or schizophrenia. The hippocampus is a small structure with an elongated shape (length of 4 to 4.5 cm, width of 1 to 2 cm), and a highly variable anatomical shape, making their segmentation challenging for subsequent analysis, affecting its shape and its volume, and potentially the results.
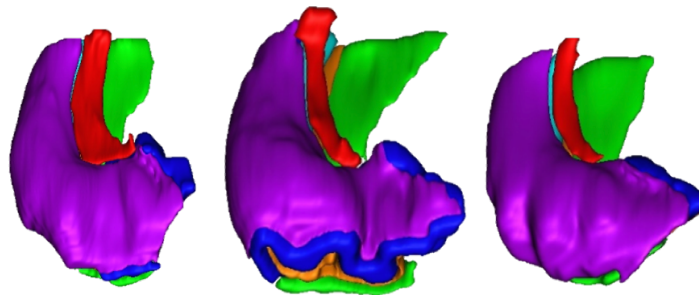
Objectives :

The goal of this internship is to estimate whether anatomical shape variability impacts automatic segmentation algorithms and how, in order to know if there is particular hippocampal shape(s) leading to failed segmentation for a given method. The general idea would be to investigate whether and how errors across various segmentation pipelines relate to 'ground truth' variations in hippocampal shape. The selected candidate will have access to manually segmented MRI that would be the ground truth to which automated segmentation methods will be compared. The candidate will then have to analyse the variability of each automated method, and of the ground truth, to then determine particular hippocampal shapes involved in automated hippocampal segmentation fails.

Inserm

Main activities :
- Bibliographic research
- Understanding and application of automatic segmentation methods
- Data analysis : Definition of adapted metric

additional activities :
- Present the work progress during lab seminar
- Optional : Write a scientific paper, if work is done properly
- Interact with other researchers

Requirements :

- Good knowledge in applied mathematics and/or computer science.
- Strong interest in neuro-imaging.
- Knowledge in image processing.

How to apply ?

Please send us the following information and documents:
- Updated CV
- Your grades and ranking of your master degree
- A motivation letter
- A recommendation letter, or the contact of a teacher or a supervisor who could recommend your application.
- The 6 months during which you are due to complete your master internship.