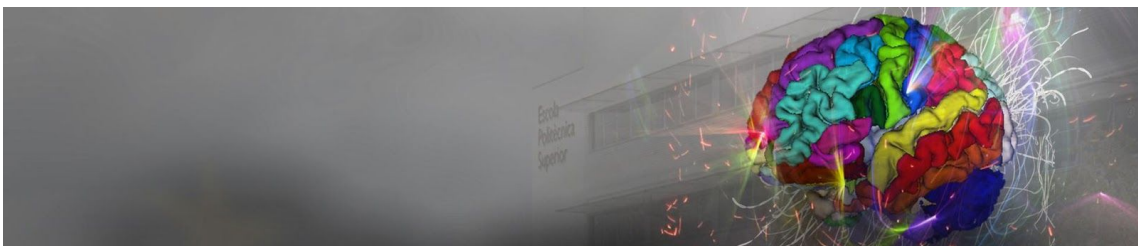




Medical Image Segmentation and applications

Image Pre-processing



Introduction

The aim of this lab is to understand the effects of the pre-processing steps seen during the lectures, in particular:

- Bias field removal.
- Noise suppression with anisotropic diffusion.

For this you will be provided different datasets of synthetic brain images with a varying degree of bias field and noise to test bias field and anisotropic diffusion.

Matlab guidelines:

- Download the matlab functions to open nii images ([Tools for NIfTI and ANALYZE image](#)). You can use: `load_nii` and `view_nii`
- Download the brain MRI images.

Objectives

A) Bias field correction.

- Download the MICO algorithm for bias field removal.
- Understand the basics of the MICO algorithm (briefly explained in the class).
- Investigate its parameters and how to run it with the brain images slice by slice (process in 2D).
- Run the program for all data in 2D and generate the bias-free images.
- With the parameters found in 2D, apply to [at least] one brain volume in 3D.
- Deliver
 - Brief explanation of the algorithm
 - Matlab code.
 - Image results before and after bias removal.
 - Note: Consider presenting quantitative and qualitative results.

B) Noise suppression. Evaluate the effects of the parameters of the anisotropic diffusion.

- Understand the file `anisoDiff2D.m`
- See the effects of the parameters on the brain images.
- Modify the code to perform isotropic smoothing (similar to Gaussian smoothing).
- Deliver
 - Matlab code.
 - Image results before and after smoothing.
 - Note: Consider presenting quantitative and qualitative results..

Coursework Submission:

Report with results of the different objectives and matlab code.

DEADLINE: It will be the one indicated in the moodle submission link. Late submission will be penalised.