



POLITECNICO
MILANO 1863

Part II: Medical Images

Laboratory projects

Augusto Bonilauri (augusto.bonilauri@polimi.it)

Valentina Bordin (valentina.bordin@polimi.it)

Beniamino Daniele (beniamino.daniele@polimi.it)

Course: Biomedical Signal Processing and Medical Images – BIOE 540-421

Teacher: Prof. Maria Gabriella Signorini

General information

For each project, you will be provided with 1 or 2 scientific papers, a dataset, a text file containing additional information, indications and tips for the implementation of the proposed algorithm.

The assignment articulates in a 2 pages Abstract + Matlab Code + Live Presentation and Discussion Session

2 pages Abstract (template provided): follow the outlined sections (Introduction, Material and Methods, Results, Discussion, and References).

Matlab Code: code workflow and implementation of solutions will require only the application of computational methods seen during laboratory classes.

Live Presentation: each group is asked to prepare **6 slides** PowerPoint presentation (**max 8 min**) of the work (1 slide introduction, 1/2 slides methods, 1/2 slides results, 1slide discussion). All team members must be involved in the presentation.

Live Discussion Session: about 10 minutes meeting with each team, Q&A session.

2 pages Abstract + Matlab Code must be uploaded on WeBeeP

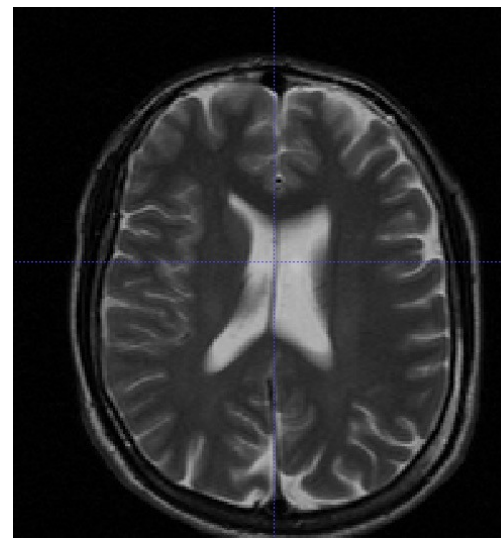
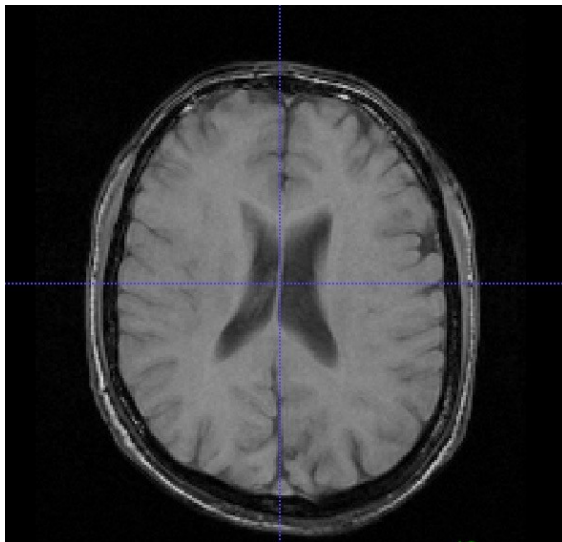
**You will find a folder with the name of your group in the
Assignment tab of the page of the course**

Deadline for uploading 23th December 2022, 11:59PM

Brain ventricle segmentation in multimodal 3D MR images

The quantitative assessment of lateral brain ventricles enables earlier and more accurate clinical diagnosis in monitoring the progression of several neurological disorders.

Project focus: Introduce the problem of segmenting brain ventricles over multiple MRI contrasts (multimodal approach) and implement a specific workflow aimed at evaluating how the resulting volumes are affected by noise characteristics.

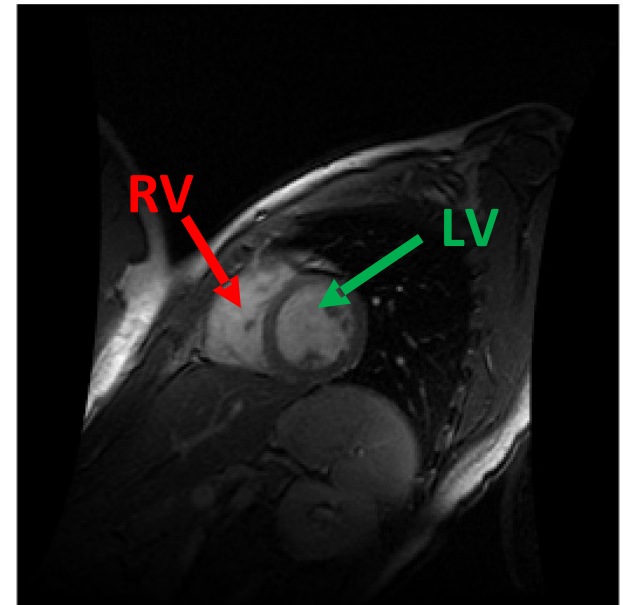


Left ventricle segmentation in short axis cardiac MR images

The recognition of heart cavities is a non-trivial task aimed to provide a quantitative assessment of cardiac morphology and functional activity

Project focus:

Introduce the problem of segmenting the left ventricle in short axis cardiac MR images, implement and test a specific workflow.

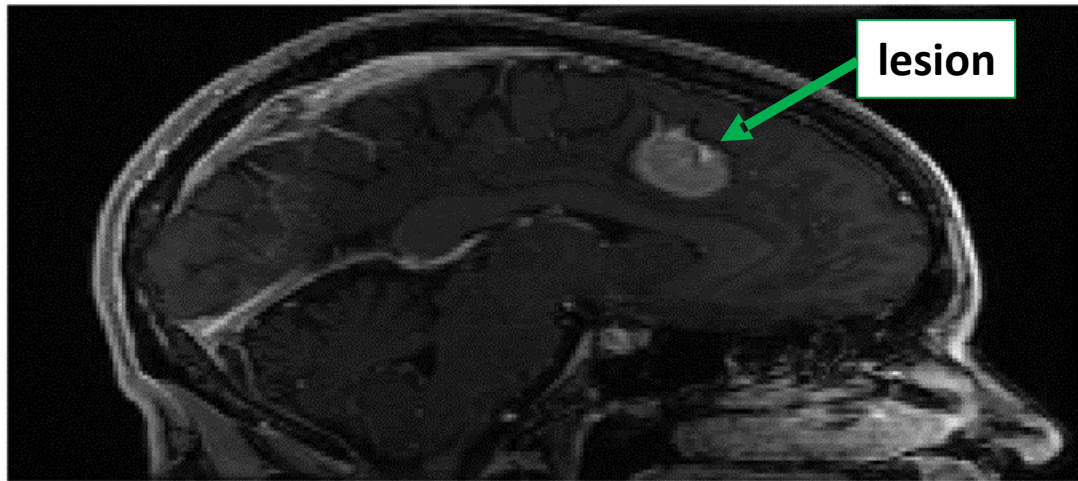


Edge detection and segmentation of lesion in MR images

The identification of cerebral structures is a mandatory aspect in diagnosis and planning of intervention-based approaches.

Project focus:

Introduce the problem of lesion segmentation and implement a specific workflow over an MRI volume.

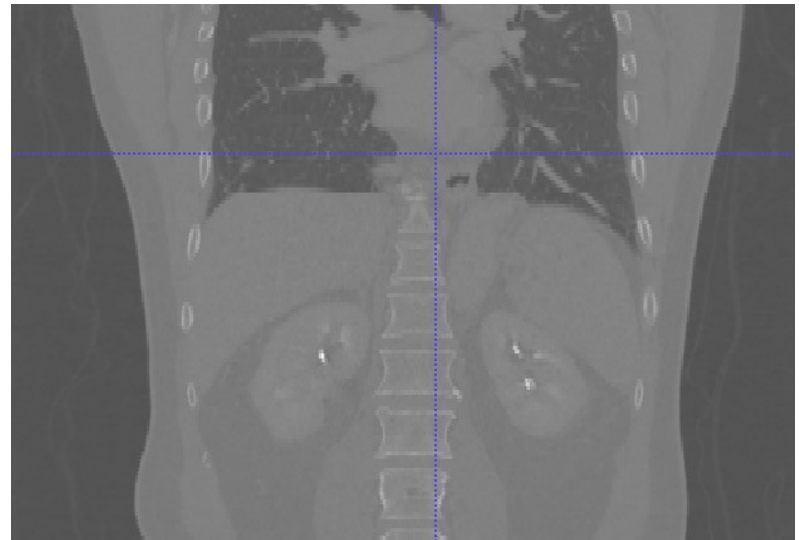
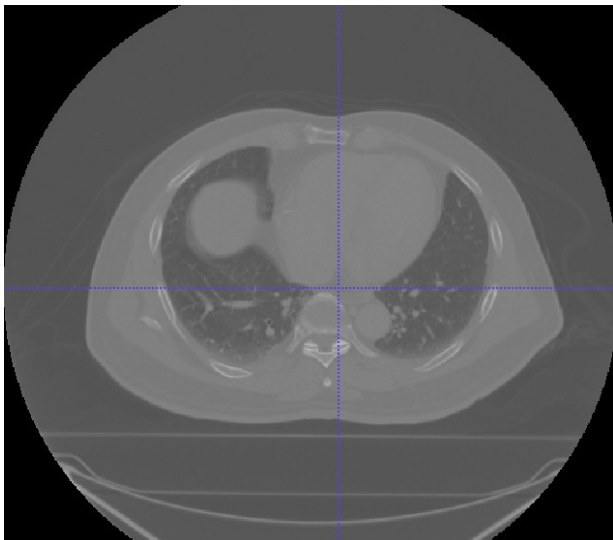


Edge detection and segmentation of lungs in CT images

Design of pre-processing workflow and evaluation of structure localization with respect to image quality.

Project focus:

Introduce the problem of 3D lung segmentation over a CT scan and implement a specific workflow aimed at evaluating the time evolution of the volume across a specific 2D slice.



Topics assignment

Groups formed for the BSP assignments **should remain the same** for the MI projects.

Material for each of the 4 topics has been already uploaded in WEBEEP , so you will find data and useful files on the WeBeep channel.

As regards topics assignment, you are allowed to express your preference for one topic, but please bear in mind that groups have to be homogeneously distributed across topics. Therefore, try to split in minimum 5 and maximum 6 groups per topic.

Please use the following OneDrive link to express your preference (in doing so, please include the names and emails of all your team members, and highlight the group leader in yellow):

https://polimi365-my.sharepoint.com/:x:/g/personal/10456182_polimi_it/Ef1x11Hu5gpGmzw6zccEOJ8BwlQ49ISDH1plZwZ4BZ8ajg?rtime=Dgn7CuXL2kg