



Thesis Project Form

Title (tentative): Deep learning architectures for ultrasound imaging classification

Thesis advisor(s): Barla Annalisa, , Francesca Odone (UniGe | DIBRIS & UniGe MaLGA)

E-mail: Annalisa.Barla@unige.it

Address:

Phone: (+39) 010 353 6602

Description

Motivation and application domain

The motivation of this master thesis lies in the study of possibly time-dependent ultrasound 2-dimensional images and the development of optimal deep learning architectures for identifying standard scan planes, with the ultimate goal of supporting medical investigation.

Indeed, ultrasound images are an effective, inexpensive, and non-invasive method used in various medical applications, that allow clinicians to visualize internal body structures and make accurate diagnosis. The interpretation of such images is, nevertheless, particularly challenging to a non-expert eye especially when using time-dependent acquisitions.

General objectives and main activities

This master thesis has three main objectives:

- to study state-of-the-art literature in the context of deep learning for medical imaging and, particularly, for ultrasound image understanding
- to devise, implement, and compare deep learning architectures used for ultrasound image classification in several medical applications, such as hepatic and fetal acquisitions
- to extend the investigation towards the development of machine learning methods that are tailored for either spatio-temporal data or for detecting specific anatomical districts

Training Objectives (technical/analytical tools, experimental methodologies)

The candidate is expected to learn how to set up a deep learning pipeline, taking into account reproducibility, statistical robustness and performance assessment beyond an accurate and appropriate choice of an optimal algorithm for the task at hand.

Also, the candidate is expected to make good use of his/her background knowledge of the biomedical domain to validate the quality of the output of the machine learning pipeline.

Place(s) where the thesis work will be carried out:

Additional information

Maximum number of students: 1