

**Project Number:** 22

**Project Title:** Automatic segmentation of computed tomography scans using MONAI and 3DSlicer

**Project Clients:** Luca Modenese

**Project specializations:** Software Development;Artificial Intelligence (Machine/Deep Learning, NLP);Bioinformatics/Biomedical;

**Number of groups:** 2 group

**Main contact:** Luca Modenese

### **Background:**

Orthopaedic applications require segmentation of radiological scans, usually from computed tomography, to extract three-dimensional bone shapes that can be used for pre-surgical plans.

The goal of this project is to use publicly available datasets of segmented medical images (several of which listed at <https://github.com/modenaxe/awesome-biomechanics>) to train a deep-learning model for automatically segmenting CT scans of the lower limb in the MONAI framework. The trained model will be made available to non-technical users through 3DSlicer so they can segment their own images and further refine the model through MONAI label.

MONAI (<https://monai.io/>) is the open-source framework that is becoming the de facto standard for developing artificial intelligence solutions related to medical images.

3DSlicer (<https://www.slicer.org>) is a widely used open-source application in which it is possible to prototype solutions involving processing of medical images.

### **Requirements and Scope:**

The project is limited to:

- the training of the MONAI model,
- the creation of the Slicer extension (using the extension wizard or based on existing similar plugins)
- the working setup of a MONAI label server.

The datasets will be provided but the data might need format transformations.

### **Required Knowledge and skills:**

- The segmentation model will be implemented in the MONAI framework, ideally using the auto3dseg.

- the Slicer extension to be similar to this one:  
<https://github.com/lassoan/SlicerMONAIAuto3DSeg>

- I would like the trained model to be made available to users also through MONAI Label for continuous refinement when further data become available.

**Expected outcomes/deliverables:**

- a trained nnUnet or auto3dseg model to use in 3D Slicer (weights)
- a Slicer plugin working with the provided model
- a MONAI label server setup to use the trained model and extend it