Context. Cardiac segmentation with elastic deformable templates has been studied for years, in particular at Creatis. Although still evolving, the method and its implementation are now able to provide good results in 3D [2] and 2D+t [3]. However, fine-tuning the segmentation parameters to fit patient data is still cumbersome due to the variety of acquisition sequences, image resolution and cardiac pathologies. Although the segmentation method under study has only a reduced number of parameters, their effect is difficult to predict and in practice, obtaining good myocardium segmentations is still an art mastered by a few. In the context of the Gwendia ANR project [4], we are aiming at using grid computing to enable massive processing of cardiac images. In particular, workflows have been developed to execute parameter sweep experiments for cardiac segmentation on the EGEE grid [1] with the goal to help parameter tuning.

Goal. The goal of this internship is to study the influence of 4 parameters on the quality of segmentation.

Method. Based on dozens of thousands of segmentations, the influence of 4 parameters (Young modulus / Poisson coefficient of the left ventricle and 2 parameters of the method) will be studied on a database of 20 patients. Optimal parameter combinations and dependencies between parameters will be looked at. In a first step, the evaluation will rely on a procedure quantifying the segmentation quality by comparison to a reference provided by a medical expert. Then, other segmentation methods could be introduced in the evaluation workflow to study segmentation accuracy. Statistical techniques such as described in [4] could be introduced in the evaluation workflow.

Skills.

• master related to image processing

- programming in C++, itk/vtk, Linux environment

**Conditions.** The internship will take place at Creatis. It will be supervised by Patrick Clarysse (CNRS researcher, cardiac segmentation aspect), Tristan Glatard (CNRS researcher, grid computing aspect) and Christopher Casta (PhD student). Indemnity according to CNRS standards (373 euros / months).

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**References**


