



Open HiWi position - AG Riboldi

The AG Riboldi from the Chair of Medical Physics is offering a working student (HiWi) position.

Software development for deformable 2D-3D image registration

In proton therapy, a necessary step to ensure a daily adaptive process is to have a 3D image of the patient. By using daily virtual-CTs based on few 2D images (proton radiographies) one can update the 3D treatment planning CT of the patient. This is expected to reduce the imaging dose and to provide updated information on daily changes in stopping power. The DFG-funded project *Radiography driven deformable image registration in adaptive proton therapy* aims to account for rigid and anatomical changes in proton therapy by using in-room proton radiographies through a novel 2D-3D deformable image registration (DIR) algorithm [1].

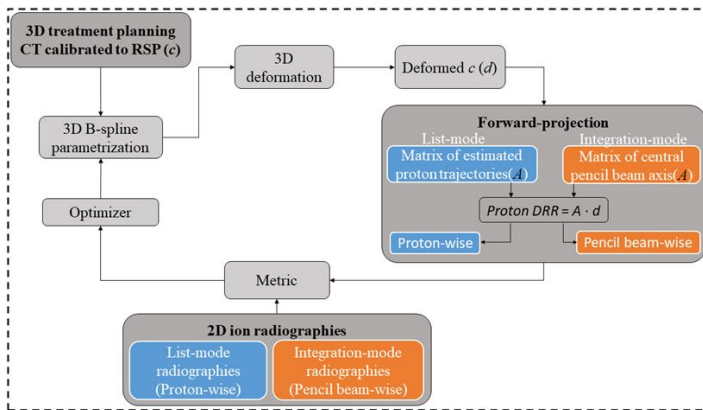


Figure 1: Flowchart of the 2D-3D registration algorithm (adapted from [1])

Promising results were obtained in a preliminary study conducted using anthropomorphic phantoms and simulations based on clinical data. A working framework of the 2D-3D DIR algorithm is implemented in Matlab (Figure 1). In general, a software translation from Matlab to a Python with GPU enhanced implementation is required. The applicant will initially work on translating the working Matlab scripts and related library files to Python and integrating several image-processing libraries. Later, a GPU implementation has to be carried out to enhance the computational efficiency. The applicant is expected to work for 2 months at 20 hours per week and paid according to HiWi salary levels. The project can be extended beyond this duration based on the applicant interest and technical ability.

Requirements & Qualifications

We seek a highly motivated applicant with strong academic record and the following background:

- Python and Matlab programming skills
- GPU implementation in Python
- Familiar with medical image processing (especially image registration) is an advantage

Contact

If you are interested to work with a clinically oriented application in the context of an innovative medical physics framework, then please contact (including a short CV, motivational letter and transcript of records),

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Reference

- [1] Palaniappan P et al. “Deformable image registration of the treatment planning CT with proton radiographies in perspective of adaptive proton therapy”. In: *Phys Med Biol* 66.4 (2021), p. 045008. DOI: 10.1088/1361-6560/ab8fc3.