

Phd Thesis at Inria Sophia Antipolis on “Machine Learning Methods for multimodal image registration in the context of Prostate Cancer Therapy”

Context : Prostate cancer is the second most common cancer in men. In fact, about 1 in 7 men will be diagnosed with this disease during his lifetime. However, most cases are detected in an early stage and are low-risk, posing little or no threat to the patient. Medical Imaging plays a key role in the diagnosis and treatment of prostate cancer. For instance, assessment of Multi-parametric MRI has recently become the reference exam for the diagnosis of prostate cancer whereas Ultrasound imaging is widely used for guiding urologists during the performance of systematic or targeted biopsies. Koelis is a French company assisting urologists and radiologists from around the world in their routine clinical practice by providing the latest technology for personalized prostate cancer planning and management, from fusion biopsy to active surveillance and prostate treatment.

Phd Topics: The goal of the thesis is to study fast and robust methods to perform non-rigid multimodal image registration in order to streamline the use of preoperative imaging during US guidance of prostate biopsies. These registration methods will require, for their training and evaluation stages, to perform among other tasks, image intensity correction, spatial normalization and the segmentation of key anatomical structures. This work will be based on extensive imaging databases acquired at several major hospitals. The objective is to leverage the latest machine learning methods to provide solutions for MR/US image registration and 3D interactive edition of image fusion.

Localization: This thesis will take place within the [Epione team](#) at Inria Sophia Antipolis and the [Koelis company](#) based in Grenoble, France, in collaboration with several major hospitals in France and around the world.

Required Competences

- Master degree with strong competences in statistical learning and mathematical modeling, as well as knowledge in medical imaging, signal and image processing (Master 2 level).
- Solid programming and IT skills are necessary (Python and C++, bash scripting, version control systems).
- Strong communication abilities
- Fluent English (written and spoken)

Contact Persons: Please send a resumé and motivation letter to:

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