Projet HARMONY: HARMONization methods for optimized therapY

OFFER DESCRIPTION

The project

Radiomics denotes the high throughput extraction of numerous quantitative metrics (including shape, intensity or textural features) of medical images with the goal of providing a full macroscopic phenotyping of tissues (tumors, organs, etc.) that could reflect at least in part the underlying pathophysiological processes (such as necrosis, proliferation, etc.), down to the genomic level [1]. Radiomics has shown promising results in identifying tumor subtypes, aggressiveness as well as in predicting response to therapy and outcome of patients in several cancers [2], however, most of these results have been obtained small, retrospective and monocentric cohorts. On the one hand, standardization was identified early on as a major limitation preventing radiomics to enter clinical practice, because of the lack of comparability of the results. No meta-analysis could be carried out, because each research group relied on different methodological workflows, software, nomenclature and implementation choices, and did not provide sufficient details for their work to be reproduced [3]. These issues have been addressed by the Imaging Biomarker Standardization Initiative (IBSI) [4]. On the other hand, it has been shown for PET [5]–[7], CT [8], [9] and MRI [10], [11] that most radiomic features exhibit moderate to high sensitivity to variability in scanner models, acquisition protocols and reconstruction settings, which constitutes the biggest challenge for multicentric studies [12].

Objectives

Our long term goal is to achieve societal impact by improving patients management. This will be achieved thanks to more robust and accurate predictive models that will help identify patients at risk before initiating treatment. In order for these tools to be exploited in the clinical routine a high level of proof is necessary, which in turn requires larger scale, multicentric (ideally prospective) studies regarding the use of radiomics and/or deep learning techniques relying on multimodal medical images, which are currently lacking. Our objectives are thus to develop harmonization techniques in both image and feature domains in order to improve, facilitate or even render feasible otherwise impossible radiomic analyses of large, multicentric, heterogeneous cohorts. In the present project, we aim at validating these methods in several applications across the consortium.

The consortium

Four teams from the West of France will be working together to address that challenge and to validate the methodological developments across six different multicentric datasets and clinical contexts.

The four teams in the consortium have extensive and complementary expertise in radiomics, medical imaging and image processing/analysis, cancer applications, machine/deep learning and statistics.

Access to a high performance computing platform (PLACIS, http://placis.univ-brest.fr/english) which is a hybrid cluster with 800 CPU cores and 50 GPUs dedicated to calculations, with a 150 TB storage facility, will be granted to all participants in the project.

Recruitment

The consortium is recruiting 1 post-doc fellow. The candidate must hold a PhD with expertise in deep learning for imaging applications (computer vision, medical imaging, etc.). Previous experience in radiomics and/or medical image analysis and cancer applications is a plus but is not a requisite. The position will be filled for a bit less than 2 years. The recruited post-doc fellow will work in two different laboratories of the network (Tours and Nantes) on different datasets and clinical applications, and will also collaborate with the other post-doc already recruited, who will work mostly in the laboratories of Brest and Angers.

Applications containing a CV and a letter of motivation, should be sent to mathieu.hatt@inserm.fr

Candidates that have not yet defended their PhD thesis will be considered as long as they have a defense date already scheduled.

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