LITO (Orsay, France) is recruiting a postdoctoral fellow/research engineer in Artificial Intelligence and Medical Imaging for oncology applications

Keywords: artificial intelligence, radiomics, deep learning, medical imaging, PET, CT, oncology, lung cancer.

LITO is seeking a postdoctoral fellow or research engineer with a strong background in artificial intelligence, data science and/or medical imaging to design prognostic models accounting for tumor dissemination based on PET/CT imaging of metastatic lung cancer patients.

The topic: In Oncology, the challenge for physicians is to determine the correct treatment for each patient at the right time, particularly in cases of lung cancer where identifying predictive biomarkers of treatment response or patient survival is critical to improve patient management. Physicians use various types of information to make treatment decisions, mainly from clinical, biological, histological and medical imaging data. Medical imaging, including morphological (CT scans) and functional (PET scans), plays a crucial role in patient management for diagnosis, therapeutic evaluation, and follow-up. Despite being systematically acquired during patient care, medical images are not yet fully utilized. The belief that medical images contain more information than what is currently extracted has resulted in the growth of the new discipline of Radiomics since 2010. Given the complexity and diversity of data available to physicians, AI approaches can assist in identifying the best therapeutic strategy for each patient. In this context, LITO is advancing quantification and data analysis methods using AI techniques to support personalized medicine.

Objectives: Cancer mortality is much higher in patients with metastatic disease. Patients with metastatic disease are all grouped into Stage IV of the American Joint Committee on Cancer (AJCC). Yet, their prognosis depends on the number and type of organs affected and their survival ranges from weeks to years. Our goal is to exploit information from all tumor sites measured using whole-body PET/CT scans to characterize the tumor spread and inter-lesion heterogeneity and built on these data to design models for refined patient stratification.

Methods: Based on whole-body PET/CT imaging, AI algorithms are now available to segment all tumor lesions as well as the different organs/tissues [Girum, *J Nucl Med* 2022][Sundar, *J Nucl Med* 2022][Wasserthal, *arxiv* 2022]. Based on these segmentations, the post-doctoral fellow will propose state-of-the-art AI approaches (eg, graph neural networks or variational autoencoder), to represent information from different metastatic sites (location, tumor burden, metabolically active volume, necrosis, heterogeneity, shape). Then, prognostic models will be built by leveraging this modelling of disease dissemination. To develop this approach, several lung cancer databases (more than 300 patients) are already available in the lab including clinical, biological and follow-up data.

Expected results: The project should yield a representation of metastatic dissemination and the design of prognostic models using that representation. The accuracy of the prediction will be characterized on several cohorts of lung cancer patients and compared to that obtained using state-of-the-art models.

The lab: The Laboratory of Translational Imaging in Oncology (LITO) is a research unit (U1288) supported by Inserm (= French NIH) and Institut Curie, the first cancer center in France. LITO has approximately 30 researchers, including physicists, engineers, physicians, pharmacists, and technologists. LITO is globally recognized for its work in radiomics and AI applied to medical imaging, particularly in PET, and develops the LIFEx platform (www.lifexsoft.org), which is a free software fully compliant with the Image Biomarker Standardization Initiative (IBSI) guidelines.

The applicant profile: The successful candidate will possess strong expertise in image analysis and/or machine learning/AI, possess excellent communication and organizational skills, and hold a Master's degree or a PhD in a relevant field (such as medical imaging, applied mathematics, or data sciences). Strong programming skills, including proficiency in Python, are required. The ideal candidate will be highly motivated, autonomous, and thrive in a multidisciplinary environment.

Starting date: from March - April 2023
Contract duration: 1 year (possible extension thereafter)
Salary: depending on candidate past experience
LITO web page: https://www.lito-web.fr/en/
Contact: to apply, please send extended curriculum vitae with research and programming experiences and a detailed list of publications, a cover letter stating your interests and future goals, and references to: fanny.orlhac@curie.fr and irene.buvat@curie.fr

References from the lab:

● Girum et al. 18F-FDG PET Maximum-Intensity Projections and Artificial Intelligence: a win-win combination to easily measure prognostic biomarkers in DLBCL patients. *J Nucl Med* 2022, 63:1925-1932.

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