

Postdoctoral position

Graph representation learning for Pulmonary Embolism Risk Stratification Models

Subject

We are seeking a highly motivated postdoctoral researcher to join our cutting-edge project aimed at establishing new clinical practices for Pulmonary Embolism (PE) management. The pulmonary vascular tree, the primary site of PE, can be modeled as a graph (see Fig. 1). Relying on our unique dataset of over 400 patients, the goal is to leverage state-of-the-art multimodal learning [3] and graph representation learning [2, 1] to develop a graph embedding unifying CTPA images, tabular patient data, and specific biomarkers.

This graph embedding will serve as the foundation for creating novel risk stratification models. Given the importance of interpretability for clinical applications, a key aspect of this research will involve exploring the learned embeddings to assess the individual contribution of each biomarker to the stratification task. This exploration will pave the way for larger-scale clinical studies, ultimately defining future clinical practices for PE management.

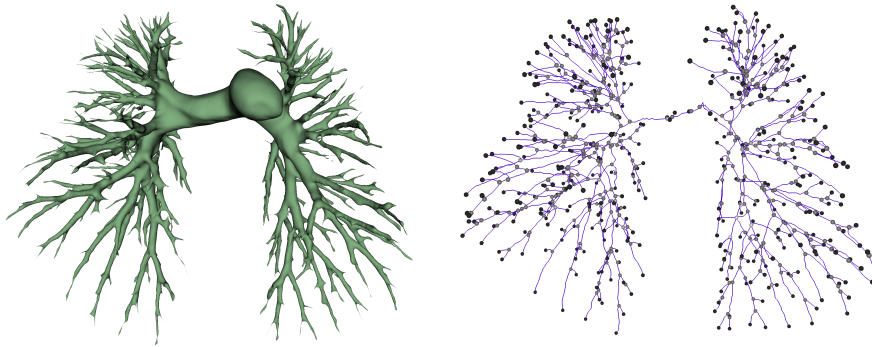


Figure 1: Segmentation of the pulmonary tree (left) and its graph modeling (right)

Job requirements

- A PhD degree in computer sciences, image processing, or related disciplines.
- Theoretical and practical expertise in at least two of the following areas: CNN, GNN, multi-modal learning, and representation learning, preferably applied to medical imaging.
- Very good programming skills in Python and Pytorch.
- Strong motivation and ability to collaborate closely with clinicians on medical applications.
- Excellent written and verbal communication skills in English.

Conditions of employment

- A two-year full-time position beginning anytime from now until January 2025.
- A monthly net salary ranging from 2200 to 2400 euros depending upon the candidate's level of experience.
- An exciting work environment in Lyon, in [Creatis](#), a large lab dedicated to medical imaging
- Close collaboration with teams in [LIX](#) and [ICube](#) and leading clinicians from [CHU Saint Etienne](#).
- Financial package to attend international conferences and hire a supporting research intern.
- Privileged access to computing resources, including an in-house GPU cluster and national [supercomputing facilities](#).

Applications

Interested candidates should send an email addressed to [Thomas Lampert](#), [Johannes Lutzeyer](#) and [Odysée Merveille](#) and attached the following:

- A full CV detailing academic background and grading information, research experience, publications, and relevant skills.
- A cover letter outlining your motivation for applying to this position
- Contact information for at least one reference who can speak to your qualifications

References

- [1] Alexandre Duval et al. "A Hitchhiker's Guide to Geometric GNNs for 3D Atomic Systems". *arXiv preprint arXiv:2312.07511* (2023).
- [2] Michelle M Li, Kexin Huang, and Marinka Zitnik. "Graph representation learning in biomedicine and healthcare". *Nature Biomedical Engineering* 6.12 (2022), pp. 1353–1369.
- [3] Peng Xu, Xiatian Zhu, and David A Clifton. "Multimodal learning with transformers: A survey". *IEEE Transactions on Pattern Analysis and Machine Intelligence* 45.10 (2023), pp. 12113–12132.