PhD position (DC3)

Pediatric brain tumour follow-up: uncertainty aware predictions and digital twin in multi-modal MRI

Location:
Lausanne University Hospital (CHUV)
Campus Biopôle, Bâtiment Proline
Route de la Corniche 10
CH-1066 Epalinges, Switzerland

Starting / Duration:
Immediately / 3 years, annual renewal

BRIDGE-AI is a Doctoral Network funded through the EU's Marie Skłodowska-Curie Actions, aimed at training a new generation of innovative and entrepreneurial-oriented doctoral candidates at various locations in Europe (Finland, the Netherlands, Belgium, Germany, Switzerland and Austria). The aim of the network is to develop new and trustworthy AI methods for longitudinal neuroimage analysis, helping clinical experts assess temporal changes in patients with chronic brain disorders.

Background

Paediatric low-grade gliomas are the most common brain tumours in children, representing up to 50% of all paediatric tumours of central nervous system. Although survival rates are excellent, these tumours are the leading cause of long-term neurological and cognitive morbidity due to their location and the intensive multimodal treatments (surgery, chemotherapy, radiotherapy) required. Children often need lifelong MRI follow-up, yet current evaluation mainly relies on manual lesion size measurements, offering limited sensitivity to subtle or diffuse brain changes.

Project description (DC3)

This PhD project aims to revolutionise follow-up imaging in pLGG through advanced AI-based quantitative analysis of longitudinal MRI data. The candidate will develop automated methods for multi-parametric change detection, assessing both tumour evolution and non-lesional brain alterations (e.g., atrophy, abnormal voxel-wise patterns). A central concept is the creation of a personalised "healthy digital twin" of each patient's brain—an AI model enabling precise comparison of patient changes over time. To do so, the project will explore deep learning techniques for 3D tumour segmentation, domain-shift robustness, and uncertainty quantification to enhance clinical reliability.

The expected outcomes include:

- An open-source tool for quantitative change detection across multiple MRI contrasts.
- A framework to generate uncertainty maps from voxel to patient level, supporting safer clinical interpretation.

By integrating clinical insight with cutting-edge AI, this project will contribute to advance assessment of response criteria in complement to current Response Assessment in Pediatric Neuro-Oncology (RAPNO) recommendations, with accurate volumetric measures with confidence intervals and individualized monitoring and ultimately improve long-term outcomes for children with brain tumours.

Your profile

- A master's (MSc) degree in physics, computer science, or electrical engineering, or similar degree with an equivalent academic level.
- You have experience in machine learning and deep learning with applications in medical imaging.
- A strong will to develop clinically actionable methods and to interact with clinicians is required.
- Good programming skills Python, including full stack and deep learning frameworks (PyTorch or TensorFlow).
- Experience with brain MRI data, or longitudinal analysis is a plus but not mandatory.
- Good skills in English (oral and written) are required. Knowledge in French is a plus.

We offer

- A multidisciplinary project jointly with Lausanne University Hospital between cutting-edge brain imaging and advanced image processing, machine learning, and clinical applications.
- A dynamic, interdisciplinary, and international team of very motivated people.
- A stimulating work environment.
- Access to cutting-edge technology and state-of-the-art resources.

How to apply

- Applications can only be submitted through Aalto University's online job platform until 30 January 2026 at 23:59 Finnish time (GMT +2), or until all positions have been filled (whichever comes first).
- Screening and filling of the positions will start as soon as applications are received. Therefore, it is recommended to apply as early as possible.
- We strive to ensure diversity and gender equality in the BRIDGE-AI network through an open, transparent, and merit-based recruitment. Women and others underrepresented in the field of computational neuroimaging are particularly encouraged to apply.
- In order to apply, you should include: (1) a cover letter explaining your motivation for applying; (2) your CV; (3) relevant transcripts of studies and certificates of your degrees; and (4) the names and contact information of at least two professional references who may be contacted regarding your application. You should indicate which position(s) you are applying to (maximum 3), and indicate the order of preference within the selected positions (1 = highest preference).
- We reserve the right to leave positions open, to extend the application period, and to reopen the application process.
- For more information about the application and selection procedure, please see the FAQ page.

IMPORTANT:

- Applicants can be of any nationality, but must not have resided or carried out their main activity (work, studies, etc.) in the country of employment for more than 12 months in the 36 months immediately before their date of recruitment. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

- At the date of the recruitment, applicants can not already be in possession of a doctoral degree. Researchers who have successfully defended their doctoral thesis but who have not yet formally been awarded the doctoral degree are also not eligible.
- Successful applications are subject to academic approval from the University of Lausanne and the Doctoral School; the selected candidate will be enrolled in the Life Science Doctoral School at the Faculty of Biology and Medicine of the Lausanne University. Funding is secured for three years, with a strong intention to seek additional funding for a fourth year.

About CIBM

The CIBM Center for Biomedical Imaging was founded in 2004 and is the result of a major research and teaching initiative of the partners in the Science-Vie-Société (SVS) project between the Ecole Polytechnique Fédérale de Lausanne (EPFL), the Université de Lausanne (UNIL), Université de Genève (UNIGE), the Hôpitaux Universitaires de Genève (HUG) and the Centre Hospitalier Universitaire Vaudois (CHUV), with the generous support from the Fondation Leenaards and Fondation Louis-Jeantet.

CIBM brings together highly qualified, diverse, complementary, and multidisciplinary groups of people with common interest in biomedical imaging.

We welcome you in joining the CIBM Community.

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