

Internship:

Medical image segmentation: application to brain aneurysms in neurosurgery

Keywords:

Medical Image Analysis, Segmentation, Applied Deep-Learning

Born from the complementarity between the field of health and communication sciences, the LaTIM is a research lab which leads multidisciplinary research driven by scientists, engineers, and physicians from the University of Brest, IMT Atlantique, INSERM and the University Hospital of Brest. Medical information is at the heart of our research projects; being by nature multimodal, complex, heterogeneous, shared and distributed, it is integrated into methodological solutions and transferred into the clinical community with the sole aim of improving the medical benefit.

Interested to be involved in a research project combining computer vision and medicine?

Context

This internship will be carried out between the LaTIM and the neurosurgery department of the University Hospital of Brest. The objective is to develop a new software solution to improve the management of brain aneurysms. An aneurysm is a weak on an artery that balloons and fills with blood. If the aneurysm ruptures, it may cause bleeding in the brain. Aneurysms can be treated preventively according to certain criteria, by either embolization or surgery. Regarding surgery, the principle is to place a titanium clip over the neck of the aneurysm, excluding the aneurysm from circulation and preserving normal blood vessels. The preparation of such intervention is still today subjective and dependent on the surgeon experience. The proposed solution aims to better assist the surgeons during this preparation phase to lower the risks during surgery and improve clipping efficiency.

This internship will thus involve:

- (1) Carrying out an exhaustive state of the art concerning the recent advances in medical image segmentation, and more particularly for brain aneurysms.
- (2) Developing an automatic segmentation method of aneurysms from 3D Digital Subtraction Angiography (DSA).
- (3) Developing an approach for the automatic extraction of clinical parameters that will be further used to assist the surgeon about the best clip model to use and its optimal placement.
- (4) Validating the global workflow.

An annotated database from the University Hospital of Brest will be provided to complete this project.

Profile

- 5th-year student in Computer Science, Computer Vision and/or Machine Learning.
- C++/Python programming skills and experience with standard Vision/Learning libs.
- Ability to deliver documented code and present results to the team.
- Ability to read scientific articles and extract relevant information.
- Prior experience on Medical Image analysis is a plus.

Conditions

Start date: February / March 2024

Duration: 6 months, indemnities

Localization: LATIM – University Hospital of Brest – 2, avenue Foch – 29200 BREST – France

Supervisors: Dual scientific/clinical supervision:

- Guillaume DARDENNE, research scientist
- Elsa MAGRO, neurosurgeon

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