INCEPTO

INTERNSHIP PROPOSALS

A few words about Incepto and you !

What we do
We co-create and distribute AI applications for medical imaging - Bridging the gap between Physicians and Engineers.

Why we do it
With more and more data, Medical Imaging is becoming more and more complex. We use Artificial Intelligence technology to transform Medical Imaging. This is a fantastic opportunity to empower physicians, saving them time, bringing them closer to their patients, and helping most of the population get access to the best modern care.

How we do it
A journey is not only about what we do but also about how we do and look at things. We place our values at the heart of our work. Centered on customer needs, the foundation of our unique team are: Sharing, Expertise, Passion & Humility, Integrity.

Take on the challenge of AI in Medical Imaging!
Together!
www.incepto-medical.com

Internship Proposals

During your internship within the data science team, you will:
- Participate in a clinical immersion to understand the practical aspects of a radiologist's daily job and his interrogation on the problem.
- Work with other experienced data scientists, radiologists, and developers of the team.
- Manage annotation worklists.
- Deliver tools that can fit into a global cloud platform.

Ideally, a good candidate should be interested by both the clinical and the algorithmic aspects of the internship.

We currently offer **4 internship topics (6 months minimum)**, all of which deal with different clinical problems. The content of each of them is presented below.

Knee Pathologies Detection Model Improvement

You will own the improvement of machine learning models to detect knee pathologies in knee MRI examinations. In collaboration with clinicians, you will participate to the creation of high-quality annotated databases to address the clinical problematic. In particular, you will use and potentially improve existing anatomical segmentation algorithms to improve pathology detection and localization.

Additionally, you should :

- Propose from scientific literature reviews, some implementations, and tools to target deformed tubular structures
- Participate in the writing of a scientific paper if your results can be published.

Pre and post-operative aorta segmentation with anatomical constraints robust to adversarial environments

You will own the design and development of a precise segmentation model for extremely varying clinical situations of the aorta on contrasted and non-contrasted CT scans. The challenge is to include anatomical constraints that ensure anatomical coherence of the segmentation under adversarial attacks.

Particular attention will be given to the transcription of segmentation models into clinically exploitable measurements. You will have an immersion with vascular surgeons to learn on how they manually do them and their importance.

Additionally, you should :

- Propose from scientific literature reviews, some implementations, and tools to target deformed tubular structures
- Participate in the writing of a scientific paper if your results can be published.

Implementation of Contrastive Learning Methods on Medical Imaging Applications

When working with medical images, a lot of unannotated data can be available, but annotations are much fewer and costly to obtain. Some methods have been recently developed to take full advantage of the non-annotated data to increase performances at low data regime in the supervised task.

Contrastive learning methods [1, 2, 3] pretrain an encoder to learn invariance between perturbed versions of an image. This encoder is then finetuned on the available labeled data for the supervised objective task. These methods have shown promising results with few labeled data [3].

During the internship you will:

1. Start by implementing state of the art methods on 2D "toy" datasets
2. Extend these methods and apply the best one to concrete 3D medical problems
3. Implement and test the methods developed by a PhD candidate on concrete 3D medical problems and compare them with state-of-the-art ones.

[1] T. Chen et al., "A Simple Framework for Contrastive Learning of Visual Representations," in ICML, 2020.

[2] A. Perakis et al., "Contrastive Learning of Single-Cell Phenotypic Representations for Treatment Classification," in MLMI - MICCAI, 2021, pp. 565−575.

[3] K. Chaitanya et al., "Contrastive learning of global and local features for medical image segmentation with limited annotations," in NeurIPS, 2020, vol. 33, pp. 12546−12558.

Active learning in production

Deep neural networks are powerful black box predictors that have recently achieved impressive performance on a wide spectrum of tasks. However, they require a huge amount of labeled data to perform as good as humans. Active learning is the process of prioritizing the data to be labelled in order to have the highest impact to training a supervised model. Prioritization is done through quantification of predictive uncertainty on deep learning models

You will be in charge of improving an in house active learning module initially used for ARVA (a deep learning based software that segments the aorta) by :

- Building a workflow to continually assess the active learning module
- Automatizing the active learning module to improve the current annotation process
- Working on the improvement of the quantification of predictive uncertainty to improve the quality of the active learning module

You will also :

- Evaluate this work on other tasks
- Experiment new methods of uncertainty estimation to be able to do active learning if necessary
- Participate into a clinical immersion to understand the practical aspects of a radiologist daily job and his interrogation on the problem.

- Propose from scientific literature reviews, some implementations and tools to target interpretability of models.
- Participate in the redaction of a scientific paper if your results can be published.

Ideally, a good candidate should be interested by both the clinical and data science aspects of the job.

How to apply ?

If you are interested in one of the topics apply here!

https://incepto-medical.welcomekit.co/jobs/candidatures-spontanees