2 Years Post-doc Position in Deep Learning & Cardiac Imaging:

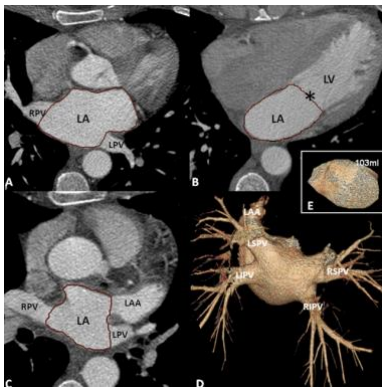
from Image Data to Arrhythmogenic Properties

Clinical Context

Cardiac Arrhythmias are a major healthcare issue. For instance, atrial fibrillation (AF) is the most common cardiac arrhythmia, characterized by chaotic electrical activation of the atria, preventing synchronized contraction. More than 6 million Europeans suffer from it and age is the most powerful predictor of risk. Life-threatening complications and fast progression to persistent or permanent forms call for as early as possible diagnosis and effective treatment of AF.

Arrhythmias are often treated with anti-arrhythmic drugs, with limited efficacy and safety. Catheter ablation, an invasive procedure, is more effective. This procedure is by no means optimized, however, and arrhythmias may reoccur. The efficacy of first time ablation may range from 30%-75% depending on the individual patient and disease, such that multiple ablation procedures may be recommended.

It is critical to understand whether an ablation procedure is likely to benefit a particular patient, and whether the arrhythmia is likely to reoccur in this patient, to maximize positive patient outcomes and ensure judicious resource allocation in our healthcare systems. Currently, there are no decision support tools enabling clinicians to access integrated patient data together with predictive models to facilitate prognosis and treatment planning.



Position Description

The aim of this project is to integrate all the existing sources of knowledge using machine learning to determine which patients are at risk for arrhythmia, which patients are good candidates for catheter ablation, and how best to perform the intervention.

The topic of the post-doc will be to analyse in collaboration with clinicians an existing database of 500+ MDCT and MRI 3D images and to use state-of-the-art deep learning algorithms for accurate analysis of such images, in conjunction with the available clinical data. This database was already segmented by a radiologist to serve as ground truth.

These segmentations will be used in machine learning tools to explore correlations between image features in this patient population and clinical factors. Detailed feature analysis using convolutional networks, and multimodal data generation using GANs will be explored. An emphasis will be put on explainable learning.

This analysis could lead to the discovery of important factors for patients' management, which could integrate a new decision support system and impact guidelines.

This post-doc position will be at IHU Liryc, Bordeaux University Hospital, a world leading centre in the treatment of cardiac arrhythmias. It will be done in collaboration with Inria, the French Institute for Research in Computer Science and Mathematics, in the Epione research team of the Inria Sophia Antipolis - Méditerranée Research Centre, located on the French Riviera.

Searched profile

- PhD in computer science or applied mathematics
- Motivated by machine learning
- Eager to work in the medical field
- Good Knowledge of Machine Learning and Statistical Analysis
- Familiar with standard Deep Learning architectures
- Good coding skills in Python
- Fluent in English (Reading, Writing, Speaking)
- Eager to learn and take initiatives

Job location: IHU Liryc, Pessac, France
Contract: 2 years (renewable)
Start: ASAP
Salary: net remuneration of 2100+ Euros/month, according to experience

Send your resume and motivation letter:
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