JOB OFFER

Postdoctoral Position (within SimCardioTest European project): Causal data analysis of in-silico trials

Context:
Despite massive investment in healthcare, huge R&D cost increase and regulatory pathway complexity hamper tremendously commercialisation of new devices & medicines, putting patient populations at risk of not receiving adequate therapy. At the same time, outside healthcare, computer modelling and simulation (CM&S) is precisely recognised to increase speed & agility while reducing costs of development. CM&S can create scientific evidence based on controlled investigations including variability, uncertainty quantification, and satisfying demands for safety, efficacy & improved access. Cardiac modelling has dramatically gained maturity over the last decades, with personalisation to clinical data enabling validation.

The SimCardioTest project was launched on January 1st 2021, funded by the European Union H2020 program, to demonstrate feasibility, effectiveness and benefits of in-silico trials for cardiac devices & drugs; with a broad aim to gain the trust of scientists, companies, regulatory bodies, physicians, patients and to promote healthcare innovation in Europe and beyond. We selected three cardiac use cases where CM&S is mature enough and that represent the most common cardiac pathologies, to demonstrate a standardised and rigorous approach for in-silico clinical trials. SimCardioTest aims to develop a unified standardised and secure cloud-based platform where in-silico trials for the selected cardiac use cases run seamlessly. This environment will go beyond the state-of-the-art in computational multi-physics & multi-scale personalised cardiac models. SimCardioTest exploitation aims at delivering a major economic impact on the European pharmaceutical and cardiac devices industry. It will accelerate development, certification and commercialisation, and will produce a strong societal impact contributing to personalised healthcare.

To meet all these goals, SimCardioTest gathers exceptional representatives of expertise of European and American computer modeling and simulation and in the field of medical devices. Ten partners from Belgium, France, Italy, Norway, Spain and USA collaborate to SimCardioTest. The consortium is composed of 2 large companies (Microport – CRM and Boston Scientific), 2 SMEs (ExactCure and InSilicoTrials), 2 research organizations (Inria and Simula), 3 Universities (University of Bordeaux, Universitat Pompeu Fabra, Polytechnic University of Valencia) and 1 international non-profit organisation (The Virtual Physiological Human Institute).

Job description:
During the first two years, the SimCardioTest consortium has been focusing on use cases standardization and implementation, acquisition of experimental data and calibration, as well as verification, validation and uncertainty quantification of the developed models. Also, all pipelines are being integrated on a cloud-based platform developed by InSilicoTrials company, which will allow to run in-silico trials for all selected use cases and identified questions of interest, by the end of current year.

The scope of the proposed project is to develop advanced statistical analysis of the in-silico generated data to maximize the extraction of relevant information from in-silico trials, and support the adoption of CM&S as reliable tools to generate scientific evidences relevant for the clinical evaluation of the targeted cardiac drugs and devices. In particular, leveraging on recent advances on causal machine learning techniques (Bayesian Causal Networks, Variational Causal Dynamics), we aim at discovering the causal pathways linking the multimodal generated variables for selection of biomarkers of interest, but also patient phenotyping and stratification. We expect that the obtained results will be key to inform clinical trials design, for instance in terms of data collection and inclusion criteria, and also to improve and guide clinical trials assessment.

The successful candidate will integrate the EPIONE (e-patient for e-medicine) research project, at Centre Inria d'Université Côte d'Azur. The longstanding research activity of the Epione Research Group revolves around the analysis and treatment of biomedical data, with a focus in machine learning, medical imaging, computational anatomy and computational physiology. The group is currently composed by 6 permanent researchers, several postdoc fellows and research engineers, and by more than 20 PhD students. During the internship the candidate will have the opportunity to interact with researchers and students from the EPIONE team and participate to the scientific life of the team and of the Inria Sophia-Antipolis center.

Qualification and personal skills:
The candidate should hold a PhD in computer science, statistics or applied mathematics. We are looking for a highly motivated candidate with a proven experience in statistics, Bayesian learning and biomedical data analysis. Programming skills (Python) are mandatory. Previous work experience in the medical field context is highly recommended, and a previous work on cardiac modeling and/or pharmacokinetics modeling is appreciated.

Strong communication abilities are required. The ideal candidate should be able to work effectively as part of a team, but also to develop independent ideas, and should be motivated to take responsibilities such as events and meetings organization.

Offer:
Competitive salary (upon experience)
2 years contract
Starting date: ideally 1st October 2022

Location:
Centre Inria d'Université Côte d'Azur,
2004 Rte des Lucioles,
06902 Valbonne, France

Application:
The application must include a CV, motivation letter and references.
Application with attachments should be sent to Irene Balelli: irene.balelli@inria.fr
Applicants may be called for an interview.