Brain-C Lab, IBPS: offre de thèse dans le cadre du concours iBio

Nous recherchons des candidat(e)s intéressé(e)s à se présenter au concours iBio pour effectuer une thèse dans notre équipe: https://www.ibps.upmc.fr/fr/Recherche/umr-8256/brainc

Les personnes intéressées doivent contacter C. Neri sans délai : christian.neri@inserm.fr

Date limite de dépôt du dossier: 16 Février 2021

Title of PhD project: Rationalizing the use of prior knowledge in systems modeling and molecular neurosciences

See also http://ibio.sorbonne-universite.fr/application-procedure/

Huntington's disease (HD), a disease caused by CAG expansion in huntingtin, is recognized as a model to understand the role of cellular resilience over senescence in neurodegenerative diseases (ND). As large omic datasets become available to study this question in HD and other NDs, there is a critical need for biologically-precise systems-modeling methods. To this end, we developed a new and promising metric for precisely modeling the responses to mutant huntingtin on molecular and functional levels. This metric is based on a design matrix that contains the prior knowledge on HD that is introduced in the analysis. Understanding the influence of such prior knowledge on the information provided by in silico models is of major interest in systems modeling. The aim of the PhD project is to rationalize and automatize the use of prior knowledge in our metric. Specifically, the aim is to identify the temporal and cell-type-specific features of HD on a system level while prioritizing target genes for early-stage intervention in HD.

The PhD candidate will address the following question: what is the temporal dynamics of cellular resilience over senescence systems in HD on molecular and cellular levels? To this end, he/she will analyze multi-dimensional data as primarily obtained in the allelic series of HD mice. These data belong to the most comprehensive dataset available to date to study the molecular pathogenesis of a neurodegenerative disease on a systems level. The Brain-C Lab, a team expert in neurosciences at Sorbonne Université, has developed new machine learning pipelines that are biologically precise and that have identified interesting and previously-undetected targets in HD. Along these lines, the Brain-C Lab and the Laboratoire Jacques-Louis Lions (LJLL), have developed an innovative approach, namely a metric well-adapted to the analysis of multi-point profiles (e.g. time-series) in complex genomic datasets, in collaboration with Barbara Gris. Expected results are (i) the generalization and accessibility of the new approach that we are developing, and (ii) a deep understanding of how the distances between genes that account for prior knowledge may influence the information that is generated by machine learning, and (iii) precise in silico models of HD, precisely highlighting the dynamics of cellular repair and resilience systems in neurodegenerative disease conditions.

Profile of the desired student: The PhD candidate should have a master degree (M2) in Mathematics or Informatics or a master degree (M2) in Biology with a specialization in Informatics/Mathematics. Excellent communication and showcasing skills are needed to apply to this position.