

Thursday, July 16, 2019

PhD position “Machine-learning approaches for data integration and patient stratification in schizophrenia and comorbid diseases”

The Health Data Science Unit (HDSU, www.hdsu.org) is a newly created unit of the BioQuant and medical Faculty of the University Heidelberg, which focuses on research topics related to digital health and the integration of clinical and genomic datasets.

The recently funded COMMITMENT project (COMorbidity Modeling via Integrative Transfer machine-learning in MENTAL illness), in which HDSU is leading one work-package, will establish an interdisciplinary research consortium for the identification of molecular hallmarks of schizophrenia and comorbid somatic illnesses, such as diabetes or cardiovascular diseases. The identification of shared and distinct biological profiles will allow disentangling patient heterogeneity and provide the basis for objective tools for personalized clinical management of psychotic disorders.

The HDSU will lead the work-package on data integration, signature extraction and transfer learning over cohorts of schizophrenia patients with different data modalities, such as MRI scans, biomarkers, clinical parameters and omics datasets such as gene expression and methylation data. We will apply approaches based on matrix-factorization and/or neural networks to learn disease signatures by combining heterogeneous data types. These methods will be extended in order to allow distributed, multi-task learning over multiple cohorts available to the consortium. A particular focus of the project is the study of shared signatures with comorbid diseases of schizophrenia such as type 2 diabetes and cardiovascular diseases.

In this context, we are looking for a **PhD student** with a focus on the following points:

- Extension of existing matrix factorization (MF) approaches for the integration of heterogeneous datasets;
- Comparison of neural network models and MF methods for the definition of molecular signatures;
- Extraction of molecular signatures using transfer learning approaches

We are looking for a candidate with the following qualifications:

- A master degree in the field of computational biology or applied mathematics with a focus on statistical learning
- Good programming skills and first experiences in the field of machine-learning
- An interest in working in an interdisciplinary field involving clinicians, biologists, statisticians and computer scientists
- Good communication skills

We are offering

- An exciting, excellent and highly multi-disciplinary research environment on the campus of Heidelberg University, Germany's oldest university
- Payment according to German TV-L E13 (65%)
- A superb living environment in Heidelberg and surroundings.

Application letters and CVs (as pdfs), together with contact information of two referees should be sent by mail to carl.herrmann@bioquant.uni-heidelberg.de