Project: Comparing methods for pathway/network analysis of genetic and other high-dimensional data, based on experimental input

Abstract
Several modern measurement techniques used within psychology and other sciences produce high-dimensional data; examples are functional magnetic resonance imaging (fMRI) and metabolomics. Metabolomics aims at the comprehensive characterization (both qualitatively and quantitatively) of all small molecules (metabolites) that are involved in cellular metabolism and that can be measured in for instance body fluids.

A metabolomics measurement represents the metabolic state of a subject containing the metabolic substrates and products at a certain point in time. Obviously, this ‘fingerprint’ is linked to the (systems) biological pathways. There is a large amount of data available on metabolic pathways and it would be very interesting to integrate this knowledge with for example both genetic data as well as expression data in order to gain a deeper understanding of the biology involved in metabolism.

There are many pathway-/network based analysis techniques to choose from. At present it is difficult deciding for one given input data of a specific kind and based on objective criteria. An example could be selecting a pathway-based functional follow-up method for genetic variants associated with a certain phenotype.

A consistency comparison of the output of various pathway/network methods could provide a framework for enabling a more objective selection of pathway-/network-based analysis methods for future studies. The empirical data of the involved networks should serve as an external standard.

In this project you will set up a pathway-analysis decision framework for future studies. After a feasibility study of the available methods, you will run analyses with the selected methods. You will compare the outcomes from these methods with each other and with an external standard. The input data for the selected methods can be in the form of reference data sets or they could come from twins and other family members of the Netherlands Twin Register (NTR).

Level
Master.

Direct clinical perspective
No.

Skills required
- A strong interest in (multivariate) statistics and an analytical mindset.
- Some background in (systems) biology / biochemistry and genetics is preferred.
- A background or interest in biology and/or genetics is preferred.
Nature of the work

(Statistical) programming, critical literature review, data management, writing and analysis of data using various methods.

Contact information

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