Bayesian Networks and Graphical Models with R

Tutorial given at the useR! 2015 conference in Aalborg, Denmark

**Presenters:**
Søren Højsgaard, Department of Mathematical Sciences, Aalborg University, Denmark and Therese Graversen, Department of Mathematics, University of Copenhagen, Denmark.

**Goals:**
Introduce participants to working with Bayesian networks (BNs) in R. This includes probability propagation in BNs and aspects of learning BNs from data. Topics will include:

- Probability propagation with Bayesian networks (BNs) and their implementation in the gRain package.
- A look under the hood of BNs to understand mechanisms of probability propagation.
- Dependency graphs and conditional independence restrictions.
- Learning BNs from data using graphical log-linear models in the gRim package.
- Learning BNs from data using the bnlearn package.

Examples from genetics will be used throughout for illustrative purposes. Moreover, there will be a running example about building a BN for a medical diagnosis from real-world data.

**Prerequisites:**
Attendees are assumed to have a working understanding of log-linear models for contingency tables.

**Literature:**