



Introduction to Graphical Models (for Network Inference) in R: Markov random Fields and Bayesian Networks (S008)

Friday February 3, 2023

Course location: Utrecht Science Park, Sjoerd Groenman Building room C028

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Time	Type	Description
09:30 – 12:30	Introductions, - Lecture and - computer lab	<ul style="list-style-type: none"> - Aim of the course - What is a Probabilistic Graphical Model (PGM)? - What is a Graph, a node and an edge? - Data structure as an input for PGM - Directed and Undirected PGM <ul style="list-style-type: none"> - Undirected PGM - Data structure - Nodes and edges in Undirected PGM - Continuous Undirected PGM - Discrete Undirected PGM - (Conditional) (in) dependency - Markov blanket/ Separators - Global Markov properties - Clique - Estimating Network structure using Undirected PGM for Continuous Variables (Continuous Undirected PGM) <ul style="list-style-type: none"> - Covariance matrix, precision matrix, partial correlation coefficients, Gaussian graphical model (GGM). - Estimating the network structure using Graphical lasso (step by step algorithm) - Computer lab



Time	Type	Description
12:30 – 13:30	Lunch break	
13:30 – 16:30	Lectures and computer labs	<ul style="list-style-type: none">- Bayesian Networks (BNs)- Data structure- Directed Acyclic Graph (DAG)- Nodes and edges in BNs- (Conditional) (in) dependency- Markov assumption- V- structure- Markov Blanket- path- collider- Blocked/open path- d-separation - Types of BNs<ul style="list-style-type: none">- Discrete BNs- Continuous BNs- Conditional linear Gaussian BNs (CLGBNs) -Estimating the DAG structure<ul style="list-style-type: none">- <i>constraint-based</i>,- <i>score-based</i> - Computer lab
16:30-17:00	More time for questions and to practice with computer lab exercises	