

Causality

Course Overview

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Course overview

- Session 1** Wednesday 13 September - course (C. Assaad)
History and motivation
Introduction to causal graphical models
- Session 2** Wednesday 20 September - lab + course (C. Assaad)
Lab on graphs
Causal discovery: constraint-based methods
- Session 3** **Thursday 21** September - lab + course (E. Devijver)
Lab on constraint-based causal discovery (0.25)
Causal discovery: noise-based methods
- Session 4** Wednesday 4 October - course (E. Gaussier)
Causal discovery: score-based and other methods
Intervention and identifiability (back-door and front-door)
- Session 5** Wednesday 11 October - course (C. Assaad)
do-calculus
Exercices

Course overview

Session 6 Wednesday 18 October - course (E. Gaussier)

Lab on Simpson paradox (0.25)

Reading article about causal representation

Session 7 Wednesday 8 November - lab + course (E. Devijver)

Estimation (ATE, double ML)

Counterfactual reasoning (ITE, propensity score, mediation)

Session 8 Monday 13 November - course (C. Assaad)

Direct and indirect effects

Application

Session 9 Wednesday 15 November - final exam

Presentation of articles (0.5)

Elements (labs + final exam) in orange are graded (the coefficient is given in parentheses)

Dot not forget your laptops for lab sessions!

Requirements for labs

- ▶ Python3
- ▶ Jupyter Notebook

- ▶ Packages
 - ▶ numpy
 - ▶ pandas
 - ▶ scipy
 - ▶ networkx
 - ▶ matplotlib
 - ▶ itertools

Research opportunities about causal inference

Internships

- ▶ Causal discovery
- ▶ Causal reasoning
- ▶ Counterfactual reasoning
- ▶ Root cause analysis
- ▶ ...

PhD proposals:

- ▶ Causal structures and representations for complex data tasks
- ▶ Causal inference in uncertain environments
- ▶ ...