

Inférence Statistique des Relations de Causalité

Vers des algorithmes d'apprentissage éthique?

ENCADRANT : FRÉDÉRIC PENNERATH

MOHAMMED FELLAJI, AHMED BEN AISSA

September, 2020

## Table des matières

F	Etu	ide Bibliographique
2	.1	let's start with an example
2	.2	Causation vs Association
		Paper : Judea Pearl
2	.4	Notations
2	.5	definition of counterfactual
2	.6	Simpson's paradoxe
2	.7	Average Causal Effect

# 1 Introduction

### 2 Etude Bibliographique

- 2.1 let's start with an example
- 2.2 Causation vs Association
- 2.3 Paper : Judea Pearl

see [1]

One of the best paper so far. It explains clearly the difference between the causal concept and the associational concept (for example : correlation). The first concept ...

#### 2.4 Notations

see [2] and [3]

- 2.5 definition of counterfactual
- 2.6 Simpson's paradoxe
- 2.7 Average Causal Effect

see [3]

3 Définition de la causalité

[4]

### Références

- [1] J. Pearl, "The mathematics of causal relations," Causality and Psychopathology: Finding the Determinants of Disorders and their Cures (P. Shrout, K. Keyes and K. Ornstein, eds.). Oxford University Press, Corvallis, OR, pp. 47–65, 2010.
- [2] L. Yao, Z. Chu, S. Li, Y. Li, J. Gao, and A. Zhang, "A survey on causal inference," arXiv preprint arXiv:2002.02770, 2020.
- [3] M. A. Hernán and J. M. Robins, "Causal inference: what if," Boca Raton: Chapman & Hill/CRC, vol. 2020, 2020.
- [4] D. B. Rubin, "Causal inference using potential outcomes: Design, modeling, decisions," *Journal of the American Statistical Association*, vol. 100, no. 469, pp. 322–331, 2005.
- [5] A. Marx and J. Vreeken, "Testing conditional independence on discrete data using stochastic complexity," arXiv preprint arXiv:1903.04829, 2019.
- [6] B. Schölkopf, "Causality for machine learning," arXiv preprint arXiv:1911.10500, 2019.
- [7] J. Pearl et al., "Causal inference in statistics: An overview," Statistics surveys, vol. 3, pp. 96– 146, 2009.
- [8] P. Judea, "Causality: models, reasoning, and inference," Cambridge University Press. ISBN 0, vol. 521, no. 77362, p. 8, 2000.
- [9] J. Pearl, M. Glymour, and N. P. Jewell, *Causal inference in statistics : A primer*. John Wiley & Sons, 2016.
- [10] J. Pearl, "The science and ethics of causal modeling," *Handbook of ethics in quantitative methodology*, pp. 383–416, 2011.
- [11] H. Matute, F. Blanco, I. Yarritu, M. Díaz-Lago, M. A. Vadillo, and I. Barberia, "Illusions of causality: how they bias our everyday thinking and how they could be reduced," Frontiers in Psychology, vol. 6, p. 888, 2015.