Code Tutorial
on
Different Causality Topics

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ESSAI & ACAI 2023
LJUBLJANA, SLOVENIA

Machines Climbing Pearl's Ladder of Causation

What we've seen* so far

- Lecture 1: Motivation and Conceptual Introduction to Causality
- Lecture 2: Formal Basics and Causal Discovery
- Lecture 3: Causal Identification and Estimation
- Lecture 4: Code Tutorial (Previous and Related Topics)

* and hopefully learned

5 Exercises
Core Topics: Identification, Estimation, Discovery

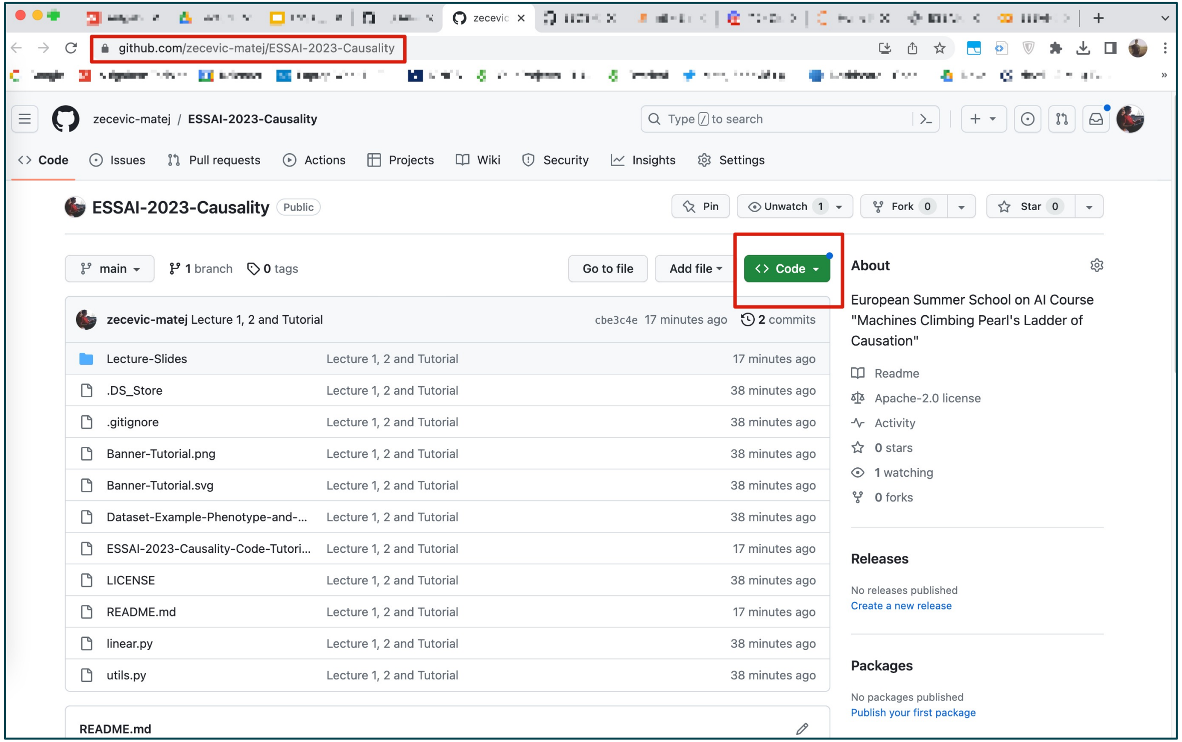
1. Simpson's Paradox
2. Parent Adjustment
3. Backdoor Adjustment
4. Estimation with Machine Learning
5. Causal Discovery

5 Exercises
Core Topics: Identification, Estimation, Discovery

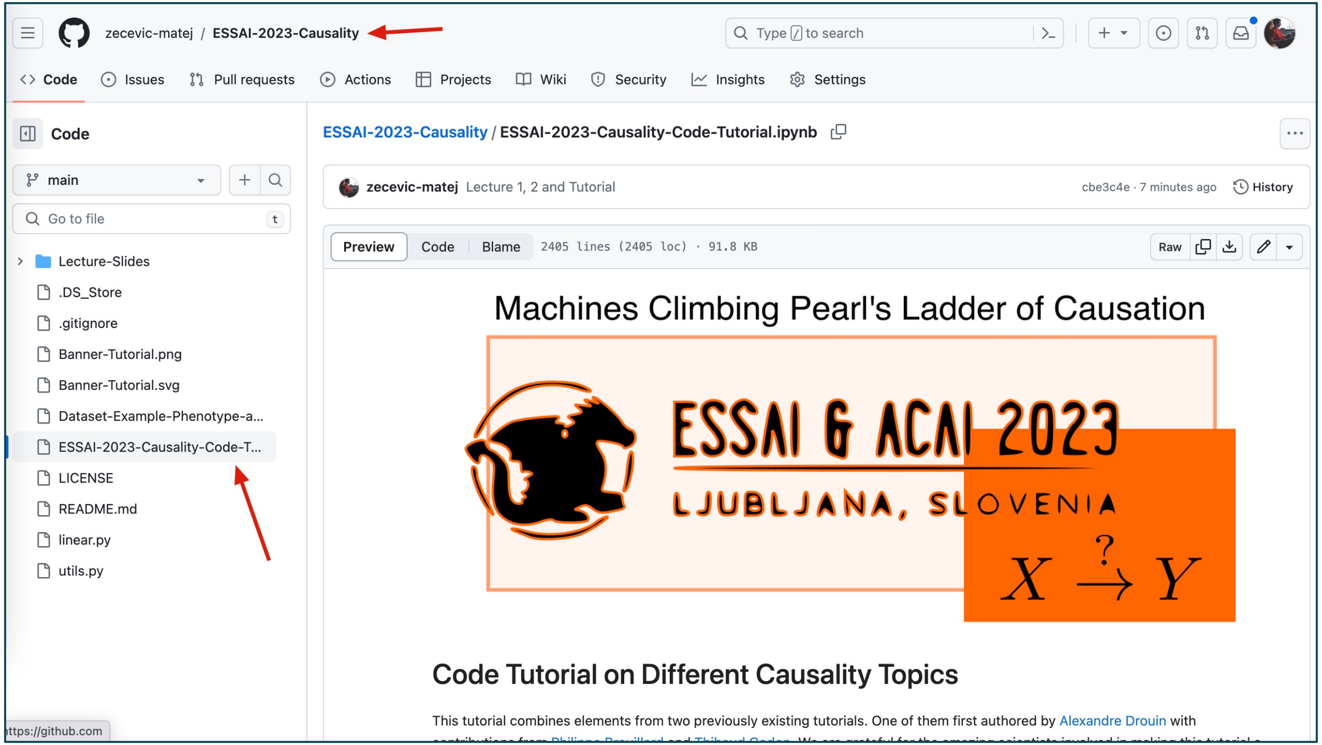
1.	Simpson's Paradox	10 min
2.	Parent Adjustment	15 min
3.	Backdoor Adjustment	15 min
4.	Estimation with Machine Learning	10 min
5.	Causal Discovery	5 min

of **supervised** trial-and-error
with 5 min **solution** after each exercise = **80 min in total**

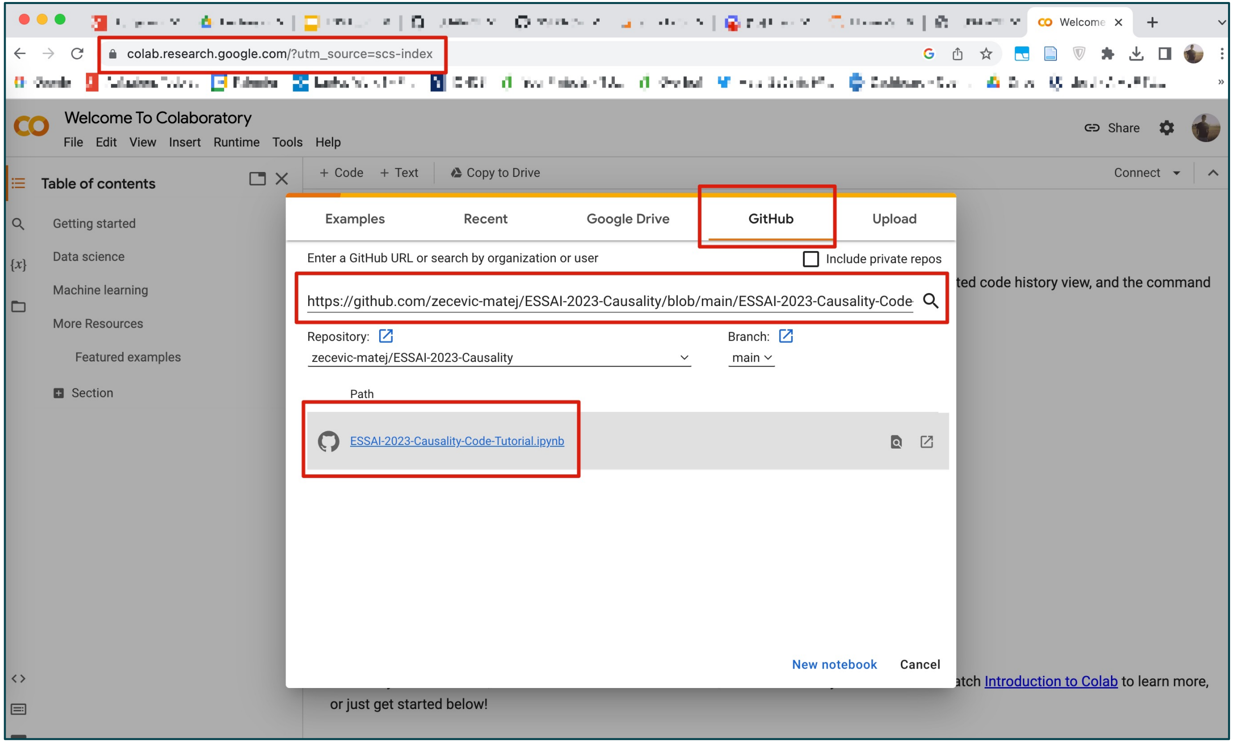
Go to the GitHub Repository and download it to your local drive as ZIP folder



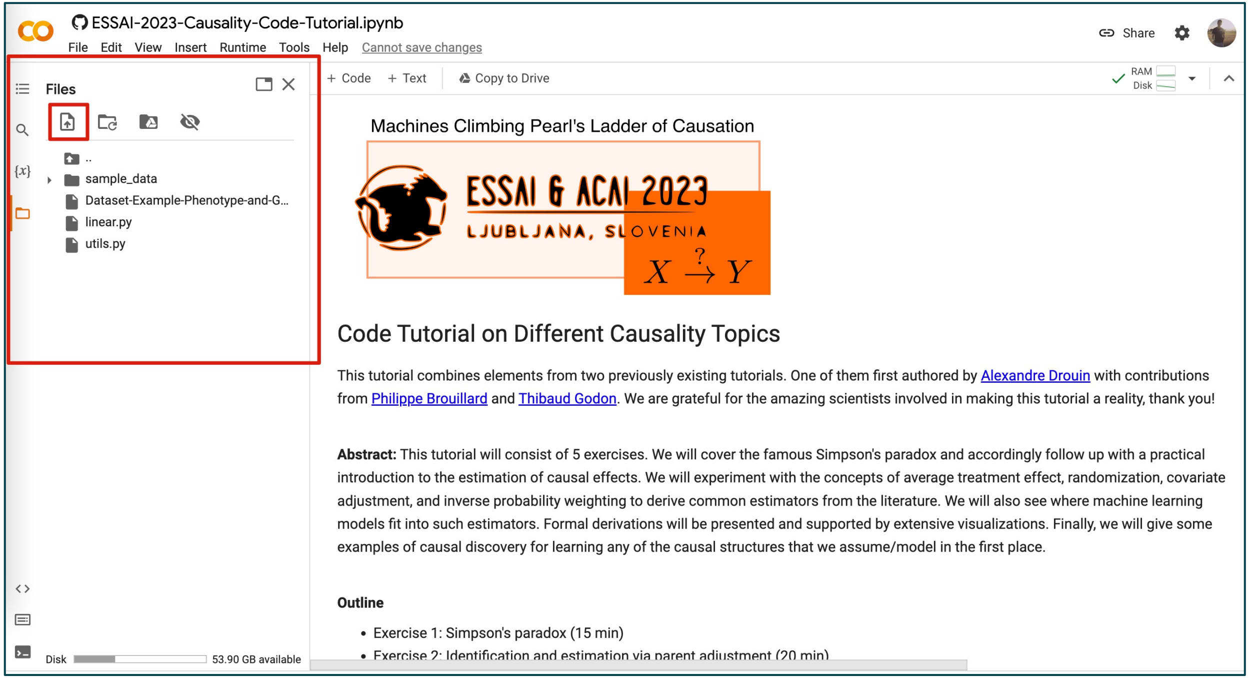
Open the Jupyter Notebook (.ipynb)



Copy the File's URL, open Google's Colab Online Coding Tool and open the Notebook



Upload the 3 remaining files (.py, .csv) from your unzipped, local repo copy



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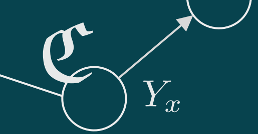
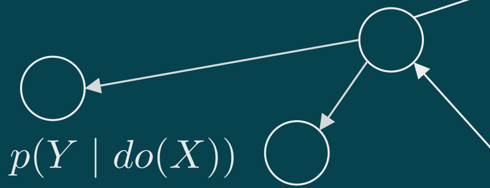
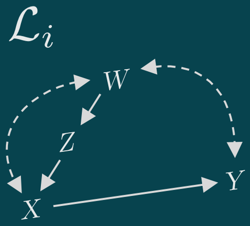




Let's Code!

See you in Google Colab



Exercise 1: Simpson's paradox (10 min)

Complete it now!

Done, discussing solution (5 min)

Exercise 1: Simpson's paradox (10 min)

Exercise 2: Parent Adjustment (15 min)

Complete it now!

Done, discussing solution (5 min)

Exercise 2: Parent Adjustment (15 min)

Exercise 3: Backdoor Adjustment (15 min)

Complete it now!

Done, discussing solution (5 min)

Exercise 3: Backdoor Adjustment (15 min)

Exercise 4: Estimation via ML (10 min)

Complete it now!

Done, discussing solution (5 min)

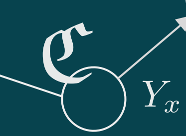
Exercise 4: Estimation via ML (10 min)

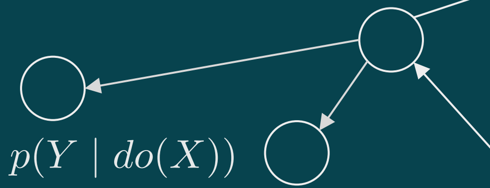
Exercise 5: Causal Discovery (5 min)

Complete it now!

Done, discussing solution (5 min)

Exercise 5: Causal Discovery (5 min)

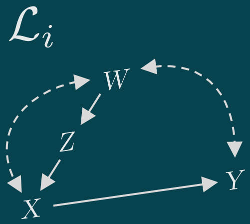




That's a wrap!

Feel free to reach out:

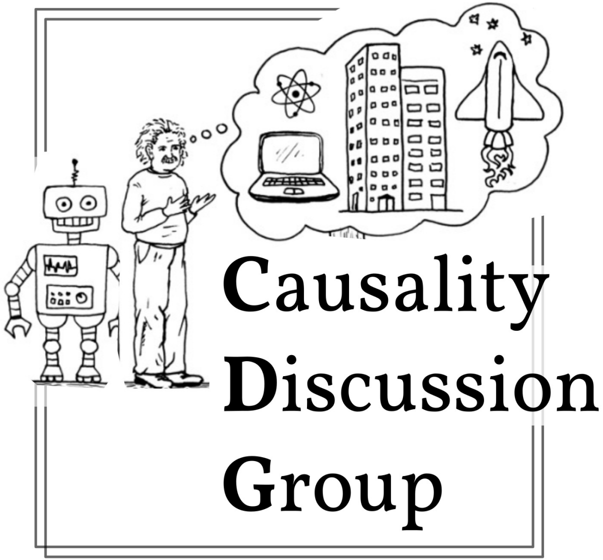
`matej.zecevic@tu-darmstadt.de`



Z | Announcements

Want to discuss more *following* this talk?

Every Week with Paper Authors
→ Discuss LIVE



530 members
on Slack

Join the community
via
discuss.causality.link

Past Sessions: [Password: Causa1ity, Direct Access Link]

- Session 01.03.2023 | **Deep Counterfactual Estimation with Categorical Background Variables** | Discussant: Edward De Brouwer
- Session 22.02.2023 | **Information-Theoretic Causal Discovery and Intervention Detection over Multiple Environments** | Discussant: Osman Ali Mian
- Session 08.02.2023 | **CLEAR: Generative Counterfactual Explanations on Graphs** | Discussants: Jing Ma, Ruocheng Guo
- Session 01.02.2023 | **Causal Transformer for Estimating Counterfactual Outcomes** | Discussant: Valentyn Melnychuk
- Session 25.01.2023 | **Abstracting Causal Models** | Discussant: Sander Beckers
- Session 18.01.2023 | **Desiderata for Representation Learning: A Causal Perspective** | Discussant: Yixin Wang
- Session 11.01.2023 | **Causal Feature Selection via Orthogonal Search** | Discussant: Ashkan Soleymani
- Session 14.11.2022 | **Rewind 2022** | Final session of 2022 to simply rewind on what we experienced throughout the year
- Session 07.12.2022 | **Causal Inference Through the Structural Causal Marginal Problem** | Discussant: Luigi Gresele
- Session 30.11.2022 | **Selecting Data Augmentation for Simulating Interventions** | Discussant: Maximilian Ilse
- Session 23.11.2022 | **On Disentangled Representations Learned from Correlated Data** | Discussant: Frederik Träuble
- Session 16.11.2022 | **Causal Curiosity: RL Agents Discovering Self-supervised Experiments for Causal Repr. Learning** | Discussant: Sumedh Sontakke
- Session 09.11.2022 | **Causal Machine Learning: A Survey and Open Problems** | Discussants: Jean Kaddour, Aengus Lynch
- Session 02.11.2022 | **A Critical Look at the Consistency of Causal Estimation with Deep Latent Variable Models** | Discussant: Severi Rissanen
- Session 26.10.2022 | **Nonlinear Invariant Risk Minimization: A Causal Approach** | Discussant: Chaochao Lu
- Session 19.10.2022 | **CausalVAE: Disentangled Representation Learning via Neural Structural Causal Models** | Discussant: Mengyue Yang
- Session 12.10.2022 | **Weakly Supervised Causal Representation Learning** | Discussant: Johann Brehmer
- Session 05.10.2022 | **Towards Causal Representation Learning** | Discussant: Anirudh Goyal
- Session 21.09.2022 | **Selection Collider Bias in Large Language Models** | Discussant: Emily McMilin
- Session 14.09.2022 | **The Causal-Neural Connection: Expressiveness, Learnability, and Inference** | Discussants: Kai-Zhan Lee, Kevin Xia
- Session 07.09.2022 | **Self-Supervised Learning with Data Augmentations Provably Isolates Content from Style** | Discussant: Julius von Kügelgen

⋮

35+ Sessions Completed and All Recorded

Want to learn more
about the genealogy
of causality research?

Genealogy of Causality

Access via genealogy.causality.link

Name	Institution	Supervisor	Location	Previous Positions
UCLA				
Judea Pearl	UCLA	?	US	Rutgers, Technion, New
Wesley Salmon	UCLA	Hans Reichenbach	US	?
Hans Reichenbach	UCLA	Paul Hensel, Max Noeth	US	Berlin, Istanbul, Erlange
John Hopkins				
Ilya Shpitser	John Hopkins		US	UCLA, Judea Pearl
Oregon State University				
Karthika Mohan	Oregon State University	Judea Pearl	US	
CMU				
Kun Zhang	CMU		Pittsburgh, US	MPI Tübingen
Clark Glymour	CMU	Wesley Salmon	Pittsburgh, US	
Peter Spirtes	CMU		Pittsburgh, US	
ETH Zürich				
Peter Bühlmann	ETH		Zürich	?
Marloes Maathuis	ETH		Zürich	?
Nicolai Meinshausen	ETH			
LMU Munich				
Stephan Hartmann	LMU		Munich, Germany	
MPI Tübingen				
Bernhard Schölkopf	MPI Tübingen	Vladimir Vapnik	Tübingen, Germ	TU Berlin
Ulrike von Luxburg	MPI Tübingen		Tübingen, Germany	
Michel Besserve				

Genealogy of Causality

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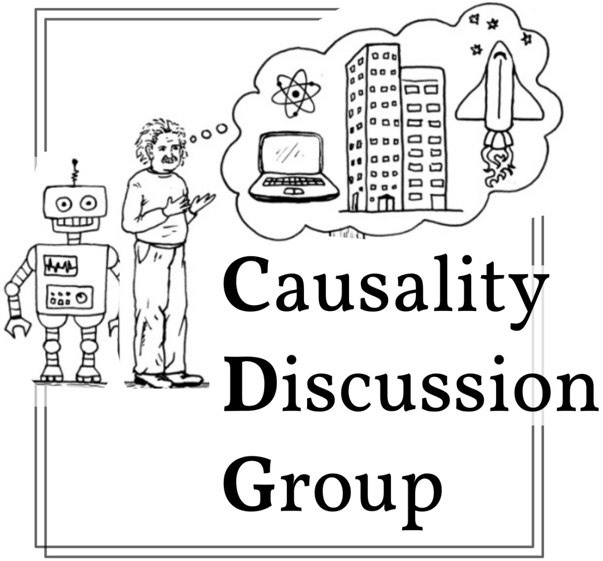
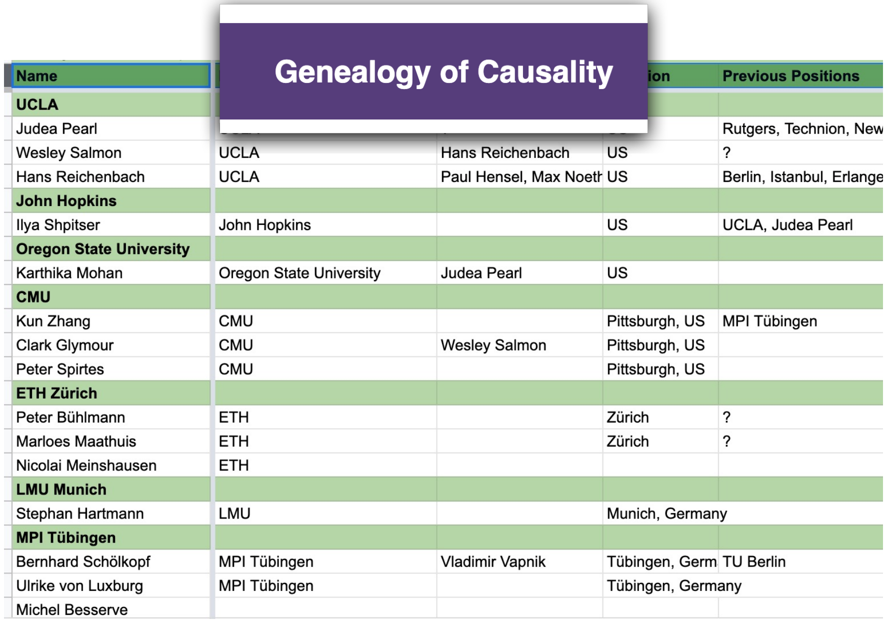
To Extend This!

Join the community
via discuss.causality.link

Access the genealogy
via genealogy.causality.link

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Oregon State University				
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ETH Zürich				
Peter Bühlmann	ETH		Zürich	?
Marloes Maathuis	ETH		Zürich	?
Nicolai Meinshausen	ETH			
LMU Munich				
Stephan Hartmann	LMU		Munich, Germany	
MPI Tübingen				
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Ulrike von Luxburg	MPI Tübingen		Tübingen, Germany	
Michel Besserve				