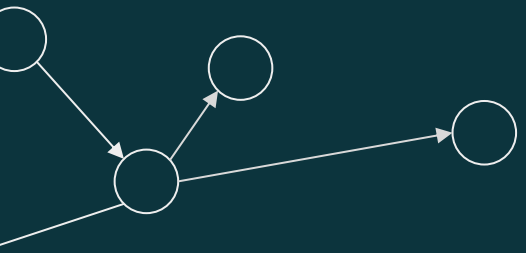

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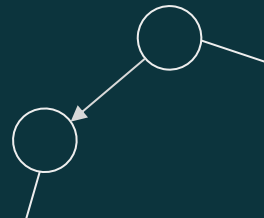
Hands-on:
Causality for Machine Learning

Matej Zečević

7th Int'l Summer School on Data Science (SSDS 2022),
Day 4, 13th October 2022



Overview of Today's Programme:

- ~~Done: *Causality for Machine Learning 1*, where we explore the basic concepts from causality that are being used in current ML research~~
  ~~9 am – 10:30 am (including Q&A)~~

- ~~Done: *Causality for Machine Learning 2*, where we discuss some selected publications and on-going work on the interface of causality and ML~~
  ~~10:45 am – 12:15 am (including Q&A)~~

- **Now**: *Hands-on session: Causality for Machine Learning,* where you get to experience some code for using causal ML first hand
  1:30 pm – 3 pm

master SSDS-2022 / Day-4 / Causality-for-Machine-Learning / Tutorial / Go to file Add file ···

zecevic-matej Added Causality for ML Material d710578 10 hours ago History

..		
Banner-Tutorial.png	Added Causality for ML Material	10 hours ago
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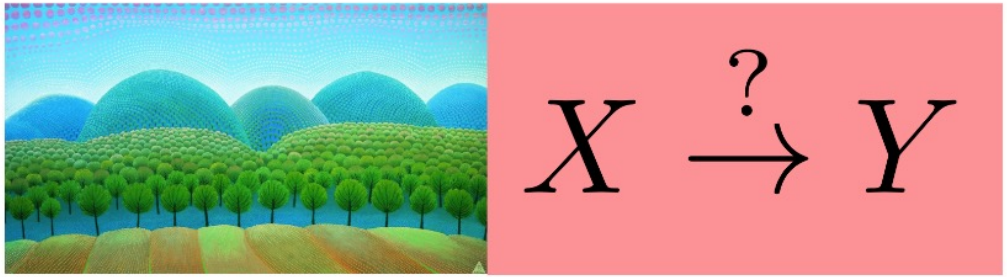
Dataset-Example-Phenotype-and-Genes-Nonlinear.csv	Added Causality for ML Material	10 hours ago
README.md	Added Causality for ML Material	10 hours ago
SSDS_2022_Hands-on_Causality_for_ML.ipynb	Added Causality for ML Material	10 hours ago
linear.py	Added Causality for ML Material	10 hours ago
utils.py	Added Causality for ML Material	10 hours ago

README.md

SSDS 2022

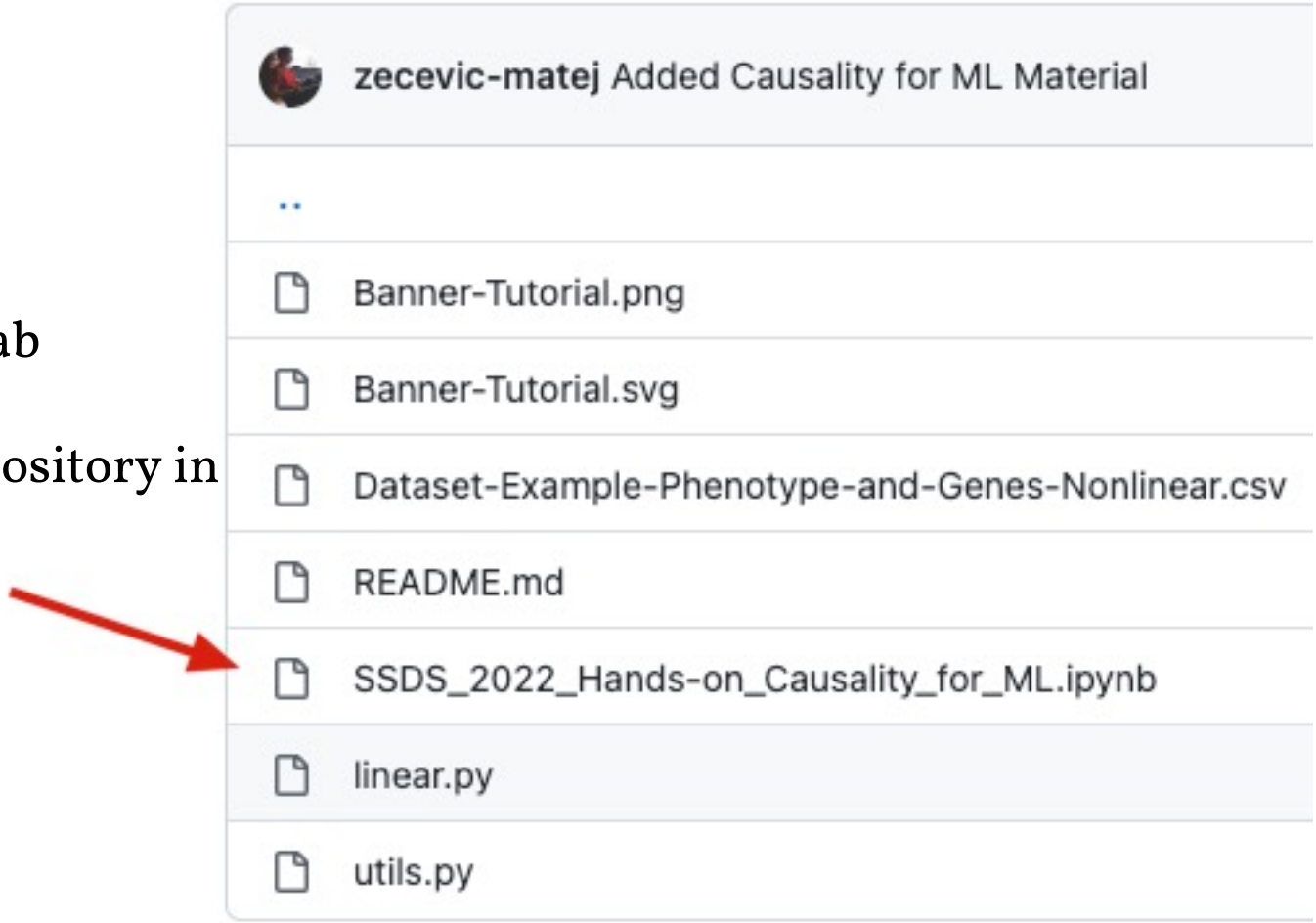


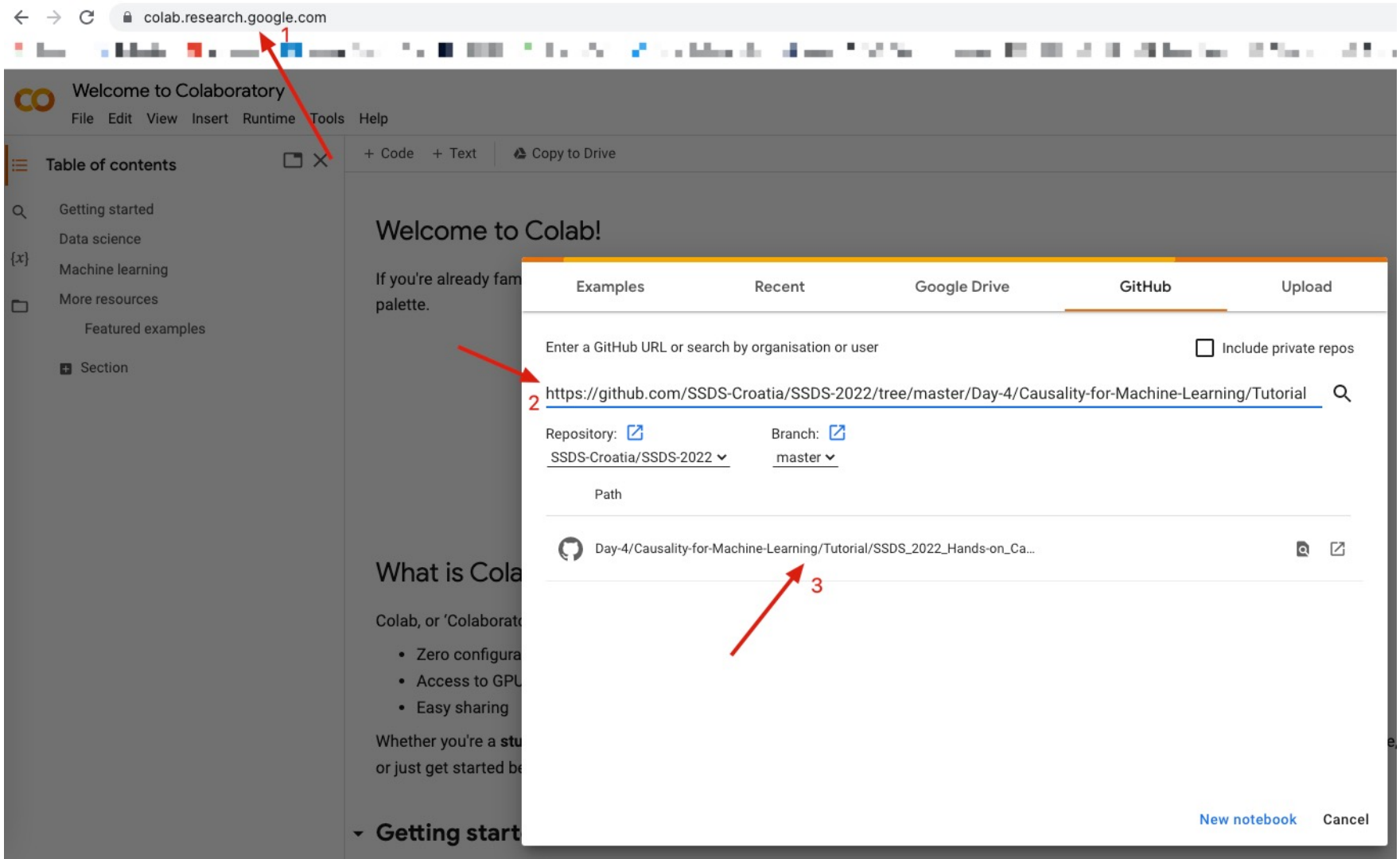
Explainable AI and Causal Learning for Data Science

Hands-on session: Causality for Machine Learning

Open in Google Colab

by searching for repository in Google Colab




colab.research.google.com
1
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Data science
Machine learning
More resources
Featured examples
Section
+ Code + Text Copy to Drive
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Access to GPU
Easy sharing
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or just get started be
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Examples Recent Google Drive GitHub Upload
Enter a GitHub URL or search by organisation or user
Include private repos
2
https://github.com/SSDS-Croatia/SSDS-2022/tree/master/Day-4/Causality-for-Machine-Learning/Tutorial
Repository:
SSDS-Croatia/SSDS-2022
Branch:
master
Path
Day-4/Causality-for-Machine-Learning/Tutorial/SSDS_2022_Hands-on_Ca...
3
New notebook
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5 Exercises

That's what it looks like

SSDS_2022_Hands-on_Causality_for_ML.ipynb

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+ Code + Text Copy to Drive

SSDS 2022

Explainable AI and Causal Learning for Data Science

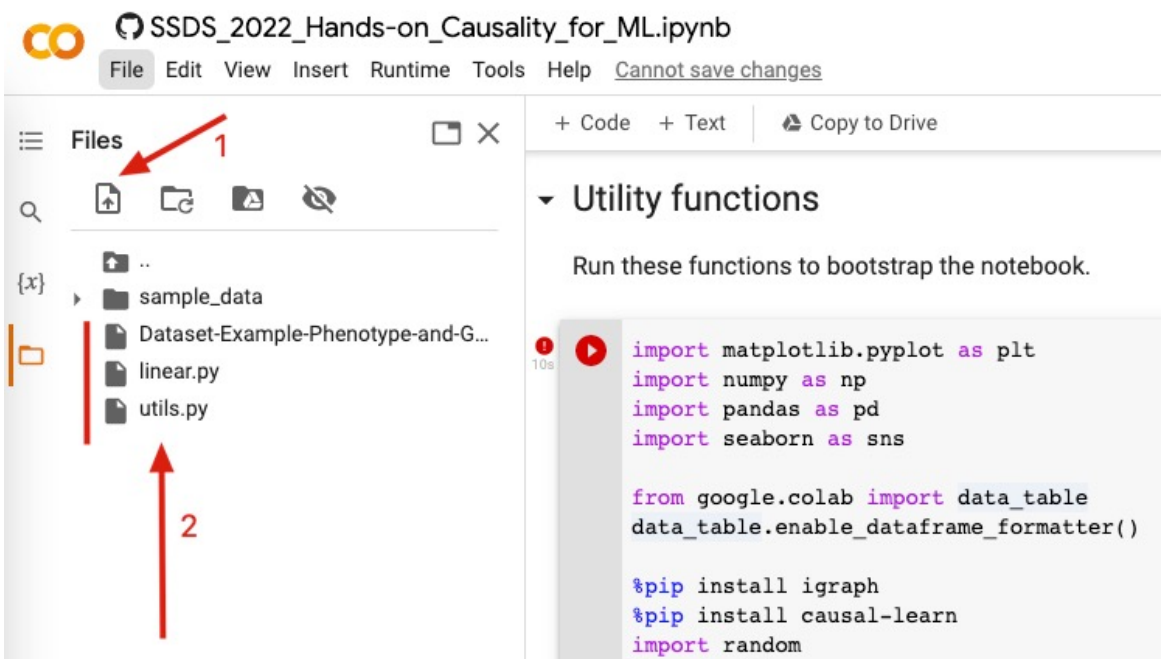
Hands-on: Causality for Machine Learning

This tutorial combines elements from two previously existing tutorials. One of them first authored by Alexandre Drouin with contributions from Philippe Brouillard and Thibaud Godon

Abstract: This tutorial will consist of a practical introduction to the estimation of causal effects. We will experiment with the concepts of average treatment effect, randomization, covariate adjustment, and inverse probability weighting to derive common estimators from the literature. We will also see where machine learning models fit into such estimators. Formal derivations will be presented and supported by extensive visualizations.

Outline

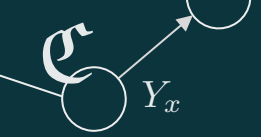
- Exercise 1: Simpson's paradox (15 min)
- Exercise 2: Identification and estimation via parent adjustment (20 min)
- Exercise 3: From parent to back-door adjustment (20 min)
- Exercise 4: Estimation via machine learning (15 min)
- Exercise 5: Causal Structure Learning (10 min)

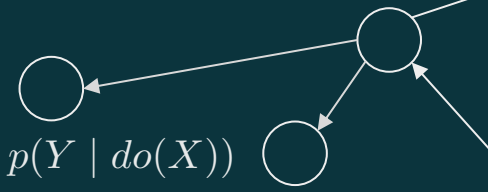


Don’t forget to upload the GitHub repository files (3 files) to the Runtime of the Google Colab

Hands-on Algorithm

1. You setup the Collab
2. We go over to the next exercise task, if none, then go to Step 5
3. Then you start exploring yourself, “learning by doing”
4. Finally, we look at the solution together and go back to Step 2
5. **We are done and have learned a lot, yeah!**





Let's Code!

See you in Google Colab.

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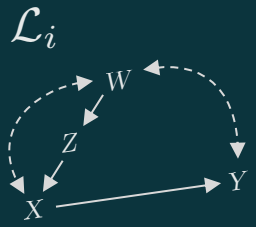
Further, my gratitude and thanks go out to Kristian Kersting, Devendra Dhami, all our collaborators,
the AIML lab @ TU Darmstadt and finally the organizers of SSDS 2022



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