Causal Representation Learning

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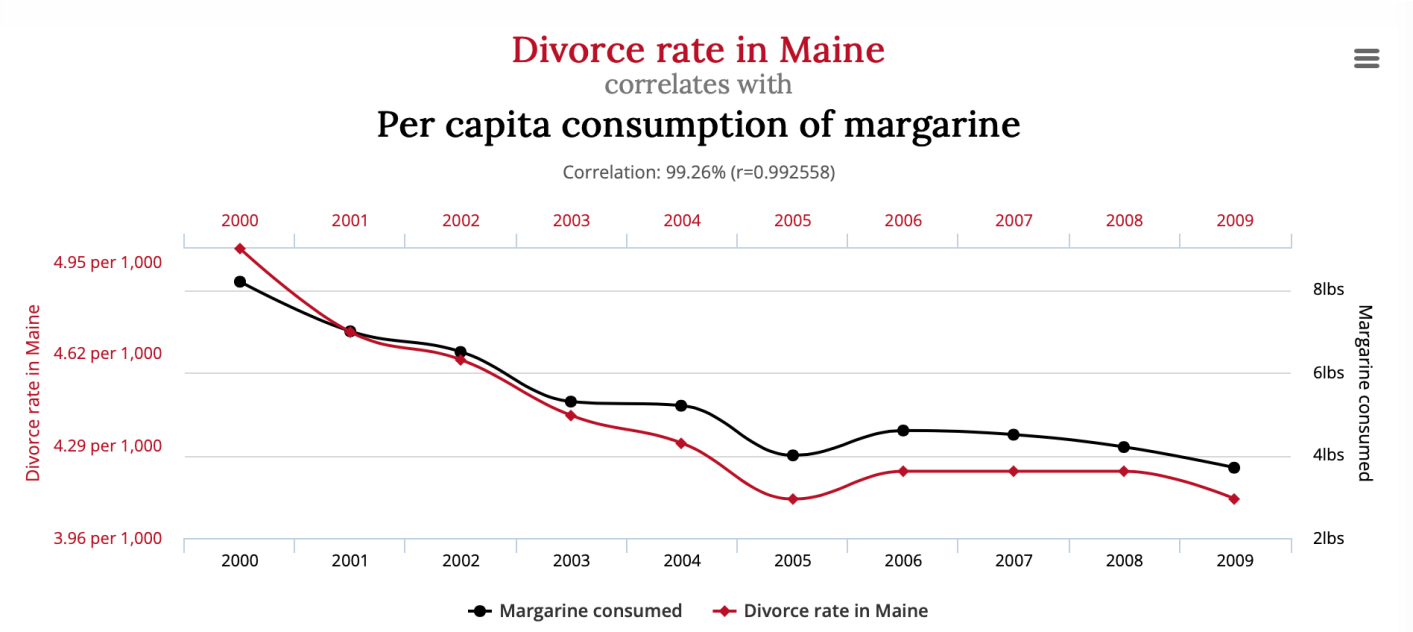
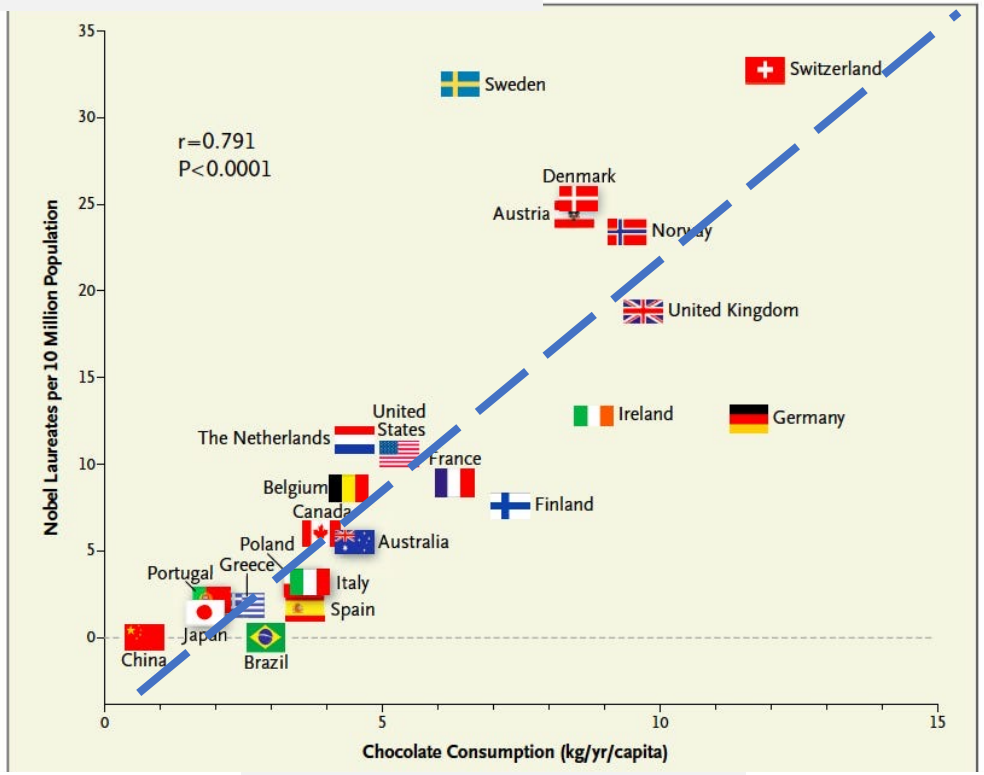
Deep Learning 1, UvA

Causality vs Correlation



Nobel Laureates per 10 Mil. Population



Chocolate consumption

Figure credit:
http://tylervigen.com/spurious-correlations
Franz H. Messerli, 2012. Chocolate Consumption, Cognitive Function, and Nobel Laureates

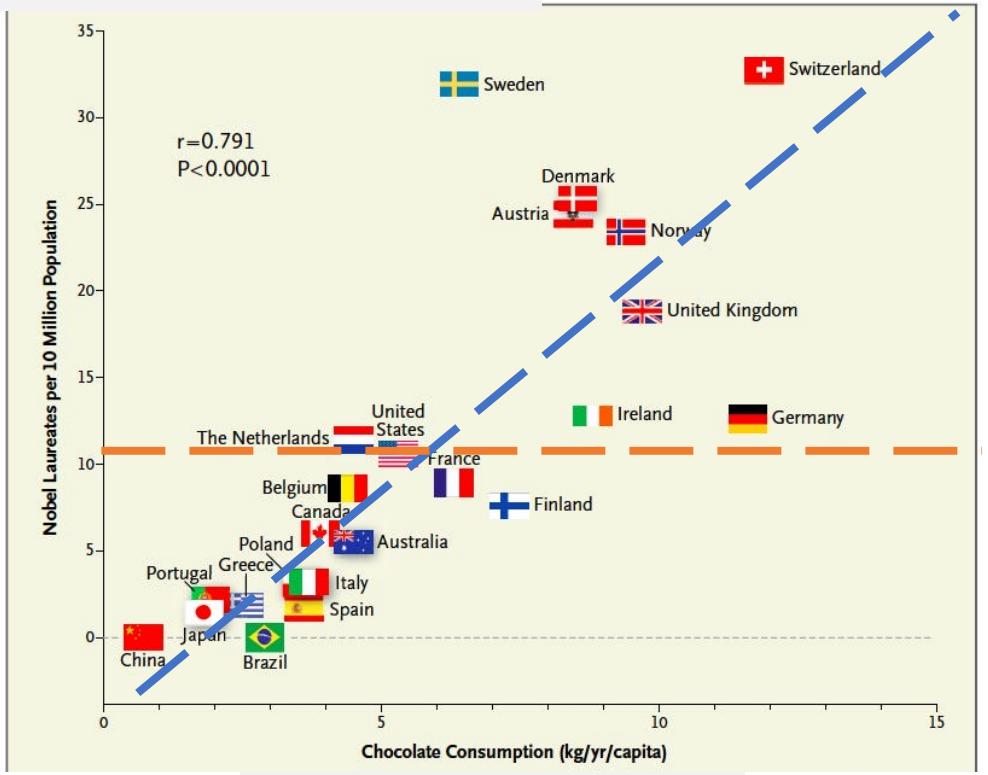
Causality vs Correlation

Correlation: $p(y|x)$

Causality: $p(y|\mathrm{do}(X = x))$

Externally enforcing chocolate consumption of country, independent of other aspects. Important for decision making

Nobel Laureates per 10 Mil. Population



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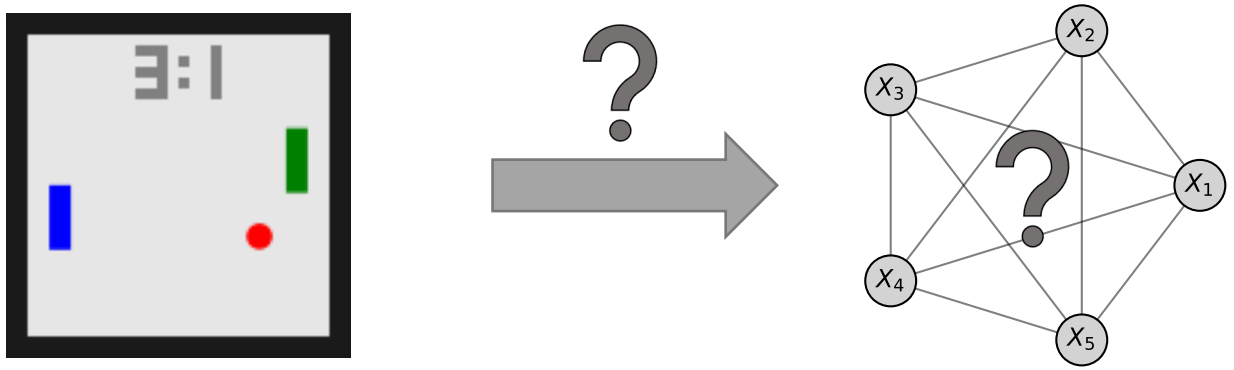
Causal Representation Learning

- Given high-dimensional observations of a (dynamical) system, what is its latent causal structure?



Causal Representation Learning

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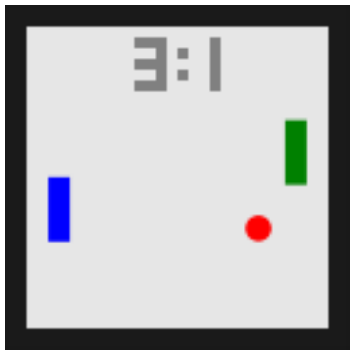
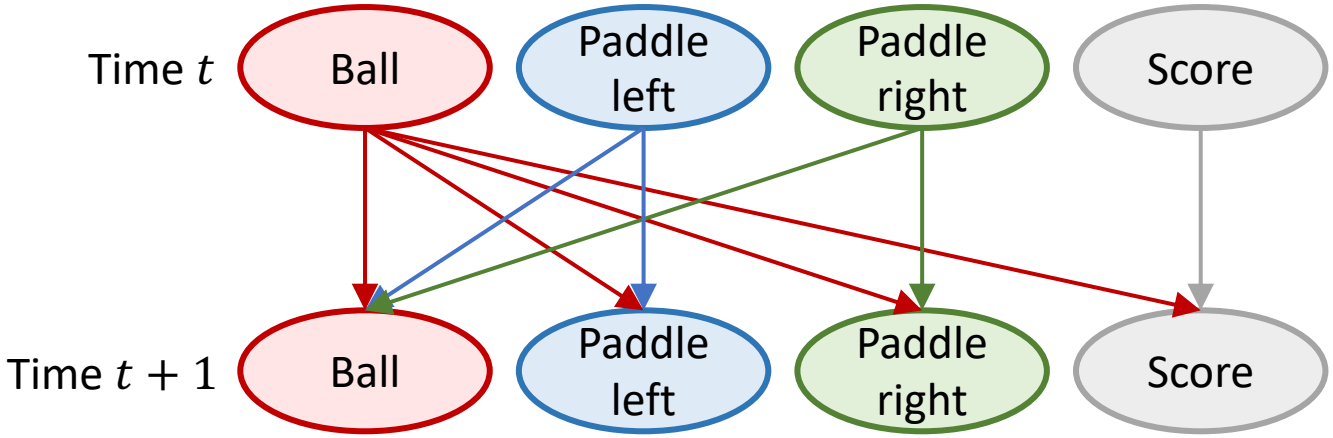
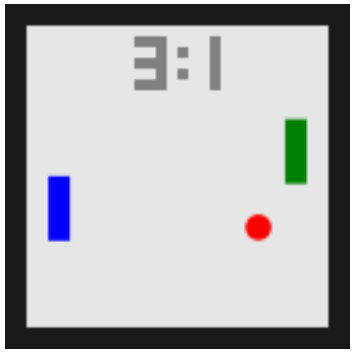




Causal Representation Learning

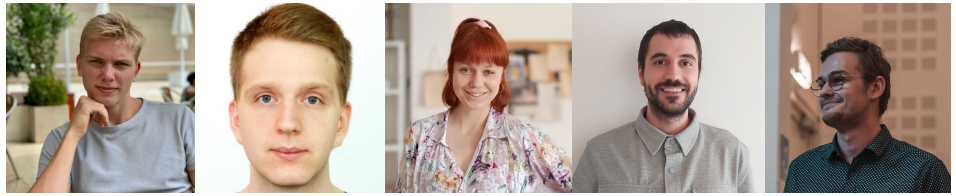
- Why care about ‘causal’ representations?
  - **Reinforcement Learning**: what-if I had taken a different action? Why did I lose?
  - **Video understanding and reasoning**: why did A follow B?
  - **Embodied AI**: Understand causal relations in a new environment, what do my action cause?
  - **A(G)I Safety**: Why did the AI do this? What does it cause?
  - And much much more…



Causal Representation Learning
Interested to learn more?

Deep Learning 2 course
Causality module

QUVA
Deep Vision Lab



Master thesis projects

Feel free to reach out :-)

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