



Australia's National Science Agency

Beyond Predictions: Making AI Reliable with Uncertainty and Causal Understanding

He Zhao

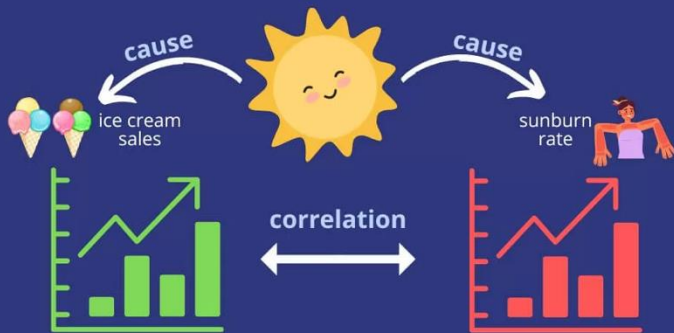
Senior Research Scientist

Foundational Machine Learning

CSIRO's Data61, Eveleigh, NSW

UNSW AI Symposium 2024

CORRELATION DOES NOT IMPLY CAUSATION

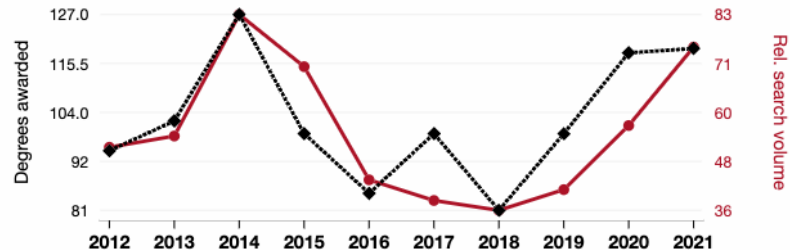


StatisticsEasily.com

Bachelor's degrees awarded in Library science

correlates with

Google searches for 'how to hide a body'



- ◆ Bachelor's degrees conferred by postsecondary institutions, in field of study: Library science · Source: National Center for Education Statistics
- Relative volume of Google searches for 'how to hide a body' (Worldwide, without quotes) · Source: Google Trends

2012-2021, $r=0.794$, $r^2=0.630$, $p<0.01$ · tylervigen.com/spurious/correlation/1840

<https://www.tylervigen.com/spurious-correlations>



Example: Student Wellbeing Project

Data from multi-sources



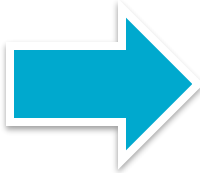
Survey data of student climate
(e.g., student wellbeing)



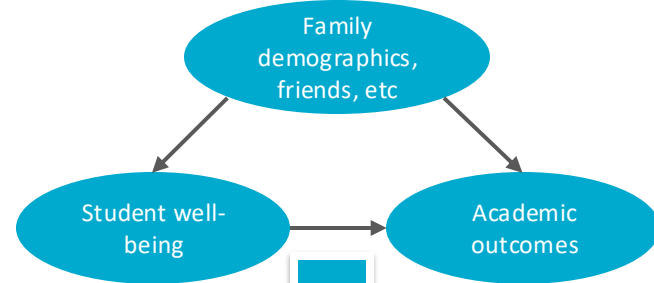
School data
(e.g., teacher information)



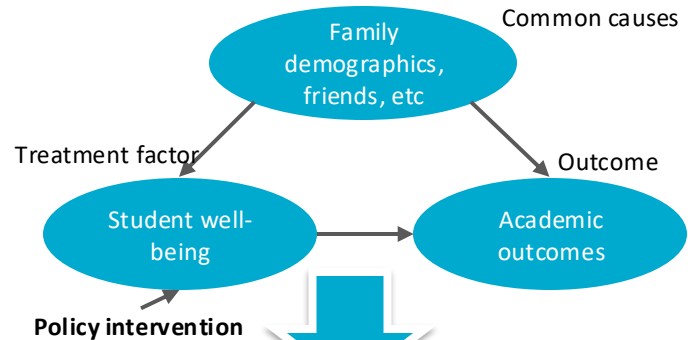
Exam data
(e.g., NAPLAN)



Causal discovery



Causal inference



Insights, e.g., improving a student's self reported depression by one standard deviation could result in a 7% improvement in NAPLAN scores between year 7 and 9



Poster (ID 15)

Explain Blackbox AI models' behaviours by generating counterfactual examples





Machine Learning on Causality @ CSIRO's Data61

Youth Wellbeing & Academic Performance with Gradient Institute



Edwin Bonilla
*Science Leader for
 Foundational Machine Learning
 Senior Principal Research Scientist*



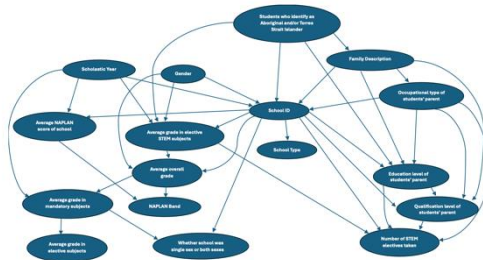
Dan Steinberg
*Team Leader for
 Decisions & Statistical Learning
 Senior Research Scientist*



He Zhao
Senior Research Scientist

**With a team of
 engineers,
 postdoc researchers
 and PhD students**

Parramatta Catholic Diocese Education Data Analytics with Schools in NSW



Causal Inference in Complex Multiscale Systems with CSIRO's Environment

What If?

Transition to a decarbonised economy

E.g. What is the impact of a delayed carbon transition on daily life?

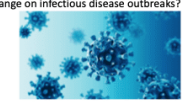


Unsustainable Living

E.g. What is the impact of the climate on food security, social unrest & conflict?



Climate Change & Pandemics





At CSIRO's Data61, we are open to

- Partnerships with industry companies
- Research collaborations with universities
- Other related opportunities of AI and machine learning
- Including but not limited to causality

Let's chat at in the poster or networking sessions!

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