

Elizabeth Silver

CONTACT INFORMATION

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RESEARCH INTERESTS

Data science, causal inference from observational data, Bayesian network structure learning, genetic regulatory networks, confounded experiments, machine learning.

EDUCATION

Carnegie Mellon University, Pittsburgh, PA.
Ph.D. in Logic, Computation & Methodology. Dec 2017
M.S. in Machine Learning. Dec 2016
M.S. in Logic, Computation & Methodology. July 2013
The University of Melbourne, Melbourne, VIC, Australia.
B.A. (Hons.) Major: History & Philosophy of Science. June 2009
B.Sc. Majors: Genetics, Psychology. June 2008

PROJECTS

Dissertation: Transfer Learning for Genetic Regulatory Networks 2013–2017
Reviewing and extending algorithms for transfer learning of large causal network structure.
Real data application: learning whole-genome transcriptional regulatory networks for sets of related organisms and sets of related cell types.

Data Analysis Project for M.S. in Machine Learning Spring 2016
Used four causal search algorithms to learn genetic regulatory networks on single-cell RNA-Seq data from mouse embryonic stem cells. Performed rigorous evaluation against ChIP-seq gold standard.

Data-Driven Digital Engagement (*Data Science for Social Good fellowship*) Summer 2015
Worked with a team to model engagement with the Australian Conservation Foundation's email campaigns. Used data on constituents' behavior and targeted experiments to optimize email success.

Data-driven knowledge graphs (*in collaboration with Pearson Education*) 2013–2014
Developed a method to automatically learn a 'knowledge graph' (i.e. the dependency graph of mathematical skills) from student performance on tests, given a measurement model.

M.S. Thesis: How to Analyze Confounded Clinical Trials 2010–2013
Compared & evaluated several methods for analyzing clinical trials, when those trials are confounded by non-adherence, unblinding, and measurement error.

PROFESSIONAL EXPERIENCE

Silverpond, Melbourne, Australia. *Causality Consultant* 2018–Current
Developed a research plan for producing a causal model of diabetes from cohort data.

SWARM Project, **University of Melbourne**, Australia. *Research Fellow* 2017–2018
Analysed experimental data to measure and explain how the SWARM experimental platform improved reasoning.

Carnegie Mellon University, Pittsburgh, PA. *Research Assistant* 2011–2016

1. Wrote documentation for Tetrad (automated causal inference software) for the Center for Causal Discovery.
2. Assisted with the DARPA 'Big Mechanism' grant, aimed at automated modeling of biological mechanisms extracted from scientific papers.
3. Collaborated with Pearson Education (see PROJECTS).
4. Organized three-day workshop on Case Studies of Causal Discovery with Model Search.
5. Designed website for the fMRI project.

Data Science for Social Good, Chicago, IL. *Data Science Fellow* Summer 2015
See PROJECTS. Worked with a team and directly with clients in a highly collaborative environment.

Vertical Knowledge LLC, Chagrin Falls, OH. *Data Science Internship* Summer 2014
Analyzed real estate data for clients' business ventures, & internal company data to measure efficiency

LANGUAGES R, Python (Pandas and Scikit-Learn packages), SQL, Bash.

PROFESSIONAL
DEVELOPMENT

Conference presentations:

‘Cross-Species Transfer Learning of Genetic Regulatory Networks.’ GHC, Phoenix (Poster) **2014**
‘Discovering Prerequisite Relationships among Knowledge Components.’ EDM, London (Poster) **2014**
‘Clinical trials, unblinding & non-adherence.’ NIPS workshop on Causality, Lake Tahoe **2013**
‘Adherence in medical trials: 1948–1980’. AAP, Melbourne, Australia **2008**
‘Towards measuring dose-response curves in Phase III RCTs’. ESPACOMP, Lyons (Poster) **2007**

SERVICE

Random Hacks of Kindness (RHoK), *Organising Committee Member* **2018–Current**
Helped to organise the two hackathons in 2018, currently organising the 2019 hackathon.

Students for Urban Data Systems, *Member & community outreach, and* **2015–17**
Alliance for Police Accountability, *Research team member*

Set up partnership between SUDS and the local, grass-roots Alliance for Police Accountability.

Initiated projects to support the APA’s advocacy work in Pittsburgh:

1. Helped create an interactive map of all 127 police departments in Allegheny County, highlighting the overlapping jurisdictions.
2. Investigating factors influencing sentencing in DA-negotiated plea deals (ongoing remote work).
3. Setting up cybersecurity clinics for local activists.

Pittsburgh GiveCamp, *Hackathon participant* **2014**

Helped build a program to optimize bus routes for a local high school’s work-study program.

Higher Achievement Pittsburgh, *Mentor* **2013–2014**

Tutored middle schoolers in math and programming (using Scratch).

Pitt-CMU Graduate Philosophy Conference, *Organizing committee member* **2011, 2012**

Worked with a team of seven people to plan & run a two-day conference; redesigned the website.