
Aubrey Barnard: Machine Learning Researcher

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Abstract

Machine learning researcher with expertise in probabilistic graphical models, causality in observational data, temporal models, medical data, relational rule learning, and databases.

Education

PhD, Computer Sciences	2019
MS, Computer Sciences	2010
University of Wisconsin, Madison, WI	
BA, Music, Computer Science	2004
Saint Olaf College, Northfield, MN	

Selected Publications

[Causal Discovery of Adverse Drug Events in Observational Data](#). **Aubrey Barnard**. PhD Dissertation, Computer Sciences, University of Wisconsin–Madison, 2019.

[Causal Structure Learning via Temporal Markov Networks](#). **Aubrey Barnard**, David Page. Probabilistic Graphical Models 9, 2018.

[Identifying Adverse Drug Events by Relational Learning](#). David Page, Vítor Santos Costa, Sriraam Natarajan, **Aubrey Barnard**, Peggy Peissig, Michael Caldwell. AAAI 26, 2012.

[Google Scholar Profile](#)

Awards

Computation and Informatics in Biology and Medicine Fellowship, National Library of Medicine, 2013–2015.

Best focus talk, National Library of Medicine Informatics Training Conference, 2015.

Computer Languages and Technologies

Python, SQL, Julia, Java, C/C++, Go, Prolog, Scheme, R, HTML, CSS, XML, Basic, OCaml, Fortran, Rust. • Bash, Make, Linux, Git, LaTeX, scikit-learn, PyTorch, matplotlib, gnuplot.

Research

Research Assistant 2008–2019

Biostatistics and Medical Informatics, UW–Madison

- Invented causal discovery machine learning and temporal inverse probability weighting methods for discovering differences between brand and generic versions of medications by analyzing controlled before–after studies. Python, scikit-learn.
- Applied survival analysis to estimate the effects of common medications on the longevity of patients using electronic health records data. Python, R.
- Developed algorithm for learning the structure of causal dynamic Bayesian networks by fitting temporal Markov networks to medical event sequences. Python, Julia.
- Researched scores for identifying causal relationships among proposed cause–effect pairs. Reduced confounding by adjusting scores with a probabilistic model of patient event sequences. Python, Go, Fortran, C/C++, SQL.
- Phenotyped adverse effects of drugs by learning relational rules with inductive logic programming. Prolog, Python, SQL.
- Implemented statistical relational model that probabilistically combined relational rules using a tree-augmented naïve Bayesian network. Java.
- Cleaned, transformed, and analyzed relational electronic health records data containing millions of patients and 50k types of events. Unix core utilities, SQL, Python.
- Analyzed experimental results with statistical analyses corrected for multiple testing. Visualized data and results with charts and plots. Python, R, matplotlib, gnuplot, scikit-learn, Java.
- Managed 1000s of long-running, parallel computing jobs. Linux, Bash, Make.
- Organized and supervised research group meetings.

Applied Scientist Intern 2017

Comprehend Medical, Amazon

- Developed recurrent neural network model of medical event sequences for summarizing medical histories of patients. Visualized clusters of patients with t-SNE. Attended daily scrum stand-ups. Presented research project to team. Python, PyTorch.

Service and Teaching

Leader 2017–2019

[AI Reading Group](#), UW–Madison

- Solicited and organized presentations on artificial intelligence and machine learning. Moderated discussions. Created and maintained web page and meeting archive. Presented when needed.

Official Tutor 2018

[Computer Sciences Learning Center](#), UW–Madison

- Helped students with introductory and intermediate programming assignments using teaching techniques learned in the course Theory and Practice of CS Education.

Reviewer 2013–2019

NeurIPS, AAAI, UAI, KDD, ECML-PKDD.

Software Development

Programmer and Technician 2006–2007

Electronic Data Interchange, Epic Systems

- Configured and customized network interfaces between Epic's ambulatory electronic medical records software and external systems for laboratory, pharmacy, etc. Supported hospitals in the installation, operation, and maintenance of such interfaces. HL7, Caché / MUMPS, VB.

Project Assistant 2005

Center for Limnology, UW–Madison

- Processed, analyzed, and visualized gigabytes of data from a water flow simulator in support of the hydrologic and biogeochemical fluxes in land–water mosaics project. Java, Excel, VBA.

Consultant Programmer 2004

Dunn County Health Department

- Designed and implemented interactive applet for educating the public on indoor air quality and healthy homes. Java, GUI, XML.