Chandler Squires

chandlersquires.com

Contact Information

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Research Interests

Causality: Causal structure learning, experimental design, causal representation learning.
Applied statistics/machine learning: Healthcare, biology, neuroscience.

Education

Ph.D. Candidate, Electrical Engineering and Computer Science **Expected June 2024**

Thesis Advisors: David Sontag, Caroline Uhler

M.Eng., Electrical Engineering and Computer Science **September 2019**
Massachusetts Institute of Technology, Cambridge, MA, USA

Thesis Advisor: Caroline Uhler

GPA: 5.0/5.0

B.S., Electrical Engineering and Computer Science **June 2018**
Massachusetts Institute of Technology, Cambridge, MA, USA

GPA: 4.9/5.0

Selected Publications

1. **Squires, C.**, Uhler, C. (2022). *Causal Structure Learning: a Combinatorial Perspective*, JoFCM [arXiv:2206.01152].
2. Belyaeva, A., Cammarata, L., Radhakrishnan, A., **Squires, C.**, Yang, K., Shivashankar, G.V., Uhler C. (2021) *Causal Network Models of SARS-CoV-2 Expression and Aging to Identify Candidates for Drug Repurposing*, Nature Comm. [arXiv:2006.03735].
3. **Squires, C.**, Magliacane, S., Greenewald, K., Katz, D., Kocaoglu, M., Shanmugam, K. (2020). *Active Structure Learning of Causal DAGs via Directed Clique Trees*, NeurIPS 2021 [arXiv:2011.00641].
4. **Squires, C.**, Wang, Y., Uhler, C. (2020). *Permutation-Based Causal Structure Learning with Unknown Intervention Targets*, UAI 2020 [arXiv:1910.09007].
5. Bernstein, D., Saeed, B., **Squires, C.**, Uhler, C. (2020). *Ordering-based causal structure learning in the presence of latent variables*, AISTATS 2020 [arXiv:1910.09014].
6. Agarwal, R., **Squires, C.**, Yang, K., Uhler, C. (2019). *ABCD-Strategy: Budgeted Experimental Design for Targeted Causal Structure Discovery*, AISTATS 2019 [arXiv:1910.09007].

Teaching Experience

Massachusetts Institute of Technology

1. Instructor: *6.S091, Causality* **January 2023**
   Link to lecture notes and recordings.
2. Teaching Assistant: *6.437, Inference and Information* **Spring 2019**
3. Teaching Assistant: *6.438, Algorithms for Inference* **Fall 2018**

Mentorship

1. Cathy Cai, BS + MEng **2023-**
2. Álvaro Ribot, BS, now at Harvard University **2022-**
3. Sathwick Karnik, BS **2020-2022**
4. Michael Truell, BS **2021-2023**
5. Eshaan Nichani, MEng, now at Princeton University **2020-2021**
6. Neha Prasad, BS + MEng, now at Valo **2020-2021**

7. Annie Yun, BS + MEng, now at HRT **2020-2021**
8. Joshua Amaniampong, BS, now at HAP Capital **2020-2021**

Academic Service

1. Reviewer for NeurIPS, ICML, UAI, AISTATS, JMLR, JOCI.
2. MIT EECS Communication Lab fellow.

Invited Talks

1. SIAM Conference on Optimization **June 2023**
2. When Causal Inference meets Statistical Analysis **April 2023**
3. Principles of Distribution Shift Workshop **2022**
4. Institute for Mathematical Sciences Annual Meeting **2022**
5. Workshop on Interactive Causal Learning **2022**
6. Simons Institute Causality Bootcamp **2022**
7. AI4Science Colloqium **2021**

Refereed Publications

1. **Squires, C.**, Seigal, A., Bhate, S., Uhler, C. (2022), *Linear Causal Disentanglement via Interventions*, ICML 2023 [arXiv:2211.16467].
2. **Squires, C.** Yun, A., Nichani, E., Agrawal R., Uhler C. (2022). *Causal Structure Discovery between Clusters of Nodes Induced by Latent Factors*, CLeaR 2022 [arXiv:2207.01237].
3. **Squires, C.**, Shen, D., Agarwal, A., Shah, D., Uhler, C. *Causal Imputation via Synthetic Interventions*, CLeaR 2022 [arXiv:2011.03127].
4. **Squires, C.**, Uhler, C. (2022). *Causal Structure Learning: a Combinatorial Perspective*, JoFCM [arXiv:2206.01152].
5. Zhang, J., **Squires, C.**, Uhler C. (2021). *Matching a Desired Causal State via Shift Interventions*, NeurIPS 2021 [arXiv:2107.01850].
6. Belyaeva, A., **Squires, C.**, Uhler. C (2021). *DCI: learning causal differences between gene regulatory networks*, Bioinformatics 2021 [bioRxiv:10.1101/2020.05.13.093765v1].
7. Belyaeva, A., Cammarata, L., Radhakrishnan, A., **Squires, C.**, Yang, K., Shivashankar, G.V., Uhler C. (2021) *Causal Network Models of SARS-CoV-2 Expression and Aging to Identify Candidates for Drug Repurposing*, Nature Comm. [arXiv:2006.03735].
8. **Squires, C.**, Magliacane, S., Greenewald, K., Katz, D., Kocaoglu, M., Shanmugam, K. (2020). *Active Structure Learning of Causal DAGs via Directed Clique Trees*, NeurIPS 2021 [arXiv:2011.00641].
9. **Squires, C.**, Wang, Y., Uhler, C. (2020). *Permutation-Based Causal Structure Learning with Unknown Intervention Targets*, UAI 2020 [arXiv:1910.09007].
10. Bernstein, D., Saeed, B., **Squires, C.**, Uhler, C. (2020). *Ordering-based causal structure learning in the presence of latent variables*, AISTATS 2020 [arXiv:1910.09014].
11. Katz, D., Shanmugan, K., **Squires, C.**, Uhler, C. (2019). *Size of Interventional Markov Equivalence Classes in random DAG models*, AISTATS 2019 [arXiv:1903.02054]
12. Agarwal, R., **Squires, C.**, Yang, K., Uhler, C. (2019). *ABCD-Strategy: Budgeted Experimental Design for Targeted Causal Structure Discovery*, AISTATS 2019 [arXiv:1910.09007].
13. Wang, Y., **Squires, C.**, Belyaeva, A., Uhler, C. (2019). *Direct Estimation of Differences in Causal Graphs*, NeurIPS 2018 [arXiv:1802.05631].

Preprints

1. Sturma, N., **Squires, C.**, Drton, M., Uhler, C. (2023). *Unpaired Multi-Domain Causal Representation Learning*, [arXiv:2302.00993].
2. Zhang, J., Cammarata, L., **Squires, C.**, Sapsis, T., Uhler, C. (2022), *Active Learning for Optimal Intervention Design in Causal Models*. [arXiv:2209.04744].
3. Truell, M, Hütter J.C., **Squires, C.**, Zwiernik P., Uhler C. (2021) *Maximum Likelihood Estimation for Brownian Motion Tree Models based on One Sample* [arXiv:2112.00816].
4. Agrawal, R., **Squires, C.**, Prasad, N., Uhler C. (2021). *The DeCAMFounder: Non-Linear Causal Discovery in the Presence of Hidden Variables*, [arXiv:2102.07921].

Industry Experience

Summer Researcher, Microsoft Research, Redmond, WA, USA **June 2021–August 2021**

Developed a contrastive learning schema for improved multivariate time-series prediction in settings with causal relationships between variables.

Summer Researcher, IBM, Cambridge, MA, USA **June 2019–August 2019**

Developed theoretical characterization of optimal experimental design strategies for learning causal graphical models.

Data Science Intern, nference, Cambridge, MA, USA **January 2018–August 2018**

Led both frontend and backend development for two new apps aimed at protein annotation and alignment and patient segmentation; analyzed custom statistical models of protein sequences