Austin D. Brown | C.V.

University of Warwick Statistics – Coventry – United Kingdom
✉ ad.brown@utoronto.ca
warwick.ac.uk/fac/sci/statistics/staff/academic-research/brown/
linkedin.com/in/austindavidbrown/ • austindavidbrown
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Research Interests

My main research focus is on the analysis and computational efficiency of Markov chain Monte Carlo algorithms. Creating reliable, computational efficient Markov chain Monte Carlo algorithms for practitioners is the main motivation for my research. My other research interests are in optimal transportation, stochastic optimization, stochastic processes, and error-in-variable models.

My dissertation at the University of Minnesota "Some Convergence Results for Metropolis-Hastings Algorithms" focuses on the computational aspects of Metropolis-Hastings algorithms available here `https://conservancy.umn.edu/handle/11299/243073`.

Education

University of Minnesota - Twin Cities **Minneapolis, MN**
Ph.D. in Statistics *August 2022*
Dissertation: "Some Convergence Results for Metropolis-Hastings Algorithms"
Advisor: Galin L. Jones
Committee: Charles Geyer, Qian Qin, Wei-Kuo Chen

University of Florida **Gainesville, FL**
B.S. in Mathematics *July 2017*
Major in Mathematics and minor in Statistics

Teaching Experience

University of Minnesota - Twin Cities **Minneapolis, MN**
Instructor *Spring 2021*
Introduction to Statistical Analysis (STAT 3011)

University of Minnesota - Twin Cities **Minneapolis, MN**
Instructor *Spring 2020*
Regression and Correlated Data (STAT 3032)

University of Minnesota - Twin Cities **Minneapolis, MN**
Teaching Assistant *Fall 2021*

Applied Statistical Methods 3 (STAT 8053)

University of Minnesota - Twin Cities **Minneapolis, MN**
Teaching Assistant *Fall 2020*
Theory of Statistics 2 (STAT 4102)

University of Minnesota - Twin Cities **Minneapolis, MN**
Teaching Assistant *Spring 2019*
Applied Statistical Methods 2 (STAT 8052)

University of Minnesota - Twin Cities **Minneapolis, MN**
Teaching Assistant *Fall 2018*
Introduction to Probability and Statistics (STAT 3102)

Publications

[1] **Austin Brown** and G. Jones, "Exact convergence analysis for Metropolis–Hastings independence samplers in Wasserstein distances," *Journal of Applied Probability*, p. 1–22, 2023.

[2] **Austin Brown** and G. Jones, "Lower Bounds on the Rate of Convergence for Accept-Reject-Based Markov Chains," *preprint https://arxiv.org/abs/2212.05955*, 2022.

[3] **Austin Brown**, "Geometric Ergodicity of Gibbs Samplers for Bayesian Error-in-variable Regression," *preprint https://arxiv.org/abs/2209.08301 (Submitted to Electronic Journal of Statistics)*, 2022.

[4] **Austin Brown** and G. Jones, "A Survey of Modern Convergence Analysis for Metropolis-Hastings," *In preparation for WIREs Computational Statistics*, 2024.

Conferences / Invited Talks

University of Warwick **Coventry, United Kingdom**
Algorithms and Computationally Intensive Inference Seminar *January 2023*
Talk Title: Lower Bounds on the Rate of Convergence for Accept-Reject-Based Markov Chains.
Slides: `https://austindavidbrown.github.io/talk/warwick2023.pdf`

University of Warwick **Wales, United Kingdom**
University of Warwick Departmental Conference 2023 *April 2023*
Talk Title: Exact convergence for independence samplers in Wasserstein distance.
Slides: `https://austindavidbrown.github.io/talk/warwickdepartmental2023.pdf`

University of Oxford **England, United Kingdom**
Bioinference 2023 *June 2023*
Poster Title: Geometric ergodicity of Gibbs samplers for Bayesian error-in-variable regression.
Poster: `https://austindavidbrown.github.io/poster/bioinference2023.pdf`

Statistical Software

cmhi: A Python package for the centered Metropolis-Hastings independence algorithm.

github.com/austindavidbrown/Centered-Metropolis-Hastings

mhlb: A Python implementation to estimate lower bounds on the geometric convergence rate for RWM Metropolis-Hastings. https://github.com/austindavidbrown/lower-bounds-for-Metropolis-Hastings

Book Editing

An Introduction to Envelopes, Dennis Cook *Jan 2019*

Referee/Peer Review

Bayesian Analysis *2020*

PLOS ONE *2022*

Advances in Applied Probability / Journal of Applied Probability *2023*

Sankhya, Series B *2023*

Service

Organizer of University of Warwick Algorithms and Computational Intensive Seminar *Jan 2023–June 2023*

University of Warwick Statistics Department IT Committee *2022–June 2023*

University of Warwick Stonewall Self-Assessment Team (LGBTQ+ Inclusion) *2022–June 2023*

Memberships

Institute of Mathematical Statistics *2022–Present*

Scholarships and Awards

Beverly and Richard Fink Fellowship ($56000+Tuition) *2017–2022*

Lynn Lin Fellowship ($2000) *2019–2019*

First Year Scholarship ($2500) *2017–2017*

Extracurricular Activities

- Markov Chain Monte Carlo Group (2019–2022)
  Discussion of the state of the art MCMC literature

Professional Experience

University of Toronto **Toronto, Ontario**
Postdoctoral Researcher *July 2023–Onward*
Advisors: Jeffrey Rosenthal

University of Warwick **Coventry, England**
Research Fellow (Postdoctoral Researcher) *September 2022–June 2023*
Advisors: Krzysztof Latuszynski and Gareth Roberts

University of Minnesota - Twin Cities **Minneapolis, MN**
Graduate Assistant/PhD Candidate *2017–2022*
Projects and responsibilities:

- As a graduate instructor and teaching assistant, I developed course materials, taught lectures, and administered exams for undergraduate and graduate courses.
- Project title: l-net: Extending the elastic-net with l1 to l10 penalties in regression.
  - Abstract: We create an R package written in C++ to combine l^1 penalized regression with higher order l^p penalizations built upon the Elastic-net. The package is able to fit regression models with penalizations ranging from l^1 to l^{10}.
  - Link: github.com/austindavidbrown/l-net
- Project title: Confidence Intervals via Gaussian Policy Gradients as an Augmented Wasserstein Gradient Flow.
  - Abstract: We introduce a novel reinforcement learning model by reformulating the policy-gradient algorithm as an augmented Wasserstein gradient flow. This formulation leads to statistically valid confidence intervals when using Gaussian policies. We focus our applications on obtaining confidence intervals in supervised learning. In image classification on CIFAR10, our model performs comparable to existing approaches and on MNIST, our model outperforms existing reinforcement learning approaches.

University of Minnesota - Twin Cities **Minneapolis, MN**
Research Assistant *2020–2020*
Project description: Applied Bayesian inference to deep learning for high-dimensional protein structure prediction.

- Principal Investigator: Singdhansu Chatterjee, NSF award: 1939956

University of Minnesota - Twin Cities **Minneapolis, MN**
Statistical Consultant *2019–2019*
Statistical consultant for the Initiative Institute on the Environment at the University of Minnesota.

- Project title: Modeling Corn Yield by Temperature and Precipitation
- Description: Extreme temperature and precipitation prediction using deep Gaussian processes for the state of Minnesota.

University of Florida **Gainesville, FL**
Full Time Student *2017*

Lightmaker **Orlando, FL**
Lead Mobile Software Engineer/Mobile Software Engineer *2012–2015*

I engineered awesome mobile applications and assisted with optimization and performance of mobile websites.

- Technologies used: Java, C, iOS, Java, Git.
- Notable projects:
  - Barclays ATP World Tour Finals;
  - Mayo Clinic;
  - AMC Extras iOS;
  - LPGA Android/iOS application;
  - Mcafee Partner iOS;
  - USGA Rules of Golf iOS/ Android;
  - Cherokee Casinos;
  - Hard Rock Tulsa;
  - Ikea;

Programming Languages, Frameworks, and Databases

Python: Pytorch, Autograd, Numpy, Matplotlib, Jupyter *Expert*

R: ggplot, Rmarkdown *Expert*

SQL: *Advanced*

C++: C++14 specification and above, Eigen *Intermediate*

Java: *Advanced*

Languages

- English (native)
- French (novice)
- Spanish (novice)

References

- Professor Galin Jones. University of Minnesota - Twin Cities. Email: galin@umn.edu
- Assistant Professor Qian Qin. University of Minnesota - Twin Cities. Email: qqin@umn.edu
- Associate Professor Krzysztof Latuszynski. University of Warwick. Email: K.G.Latuszynski@warwick.ac.uk