Gonzalo E. Mena

Department of Statistics and Data Science, Carnegie Mellon University 5000 Forbes Ave Pittsburgh, PA, 15213

Email: gmena@andrew.cmu.edu WEBSITE: http://gomena.github.io Office: Baker Hall 229i

Current position

Assistant Professor, Department of Statistics & Data Science, Carnegie Mellon University.

Education

2014-2018	PhD. in Statistics, Columbia University
	Advisor: Liam Paninski.
	Committee: David Blei, John Cunningham, Andrew Gelman, John Paisley.
2012-2014	M.A. Statistics, Columbia University
2007-2011	Mathematical Engineer Certificate, University of Chile.
2005-2007	Bs. Engineering, University of Chile.

Employment and Research Experience

September 2023 - Present	Assistant Professor. Department of Statistics and Machine Learning, Carnegie Mellon University.
July 2020 - Au- gust 2023	Florence Nightingale Bicentennial Fellow and Tutor in Computational Statistics and Machine Learning. Department of Statistics, University of Oxford.
April 2022 - May 2022	Long-Term Visitor (Decision Making and Uncertainty Program). Institute for Mathematical and Statistical Innovation (IMSI), University of Chicago.
Sept 2018 - June 2020	Data Science Initiative Postdoctoral Fellow. Mentor: Pierre Jacob. Harvard University
Summer 2018	Summer Research Fellow. Mortimer Zuckerman Mind Brain Behavior Institute and Gross- man Center for the Statistics of Mind, Columbia University.
Summer 2017	Software Engineer (Research) Intern. Host: Jasper Snoek. Google Brain, Cambridge, MA.
Summer 2008	Research intern. University of California, San Diego. Host: Rafael Nuñez

Publications

JOURNAL ARTICLES

- Larsen, S., Shin, I., Joseph, J., West, H., Anorga, R., Mena, G., Mahmud, A., Martinez, P. Quantifying the impact of SARS-CoV-2 temporal vaccination trends and disparities on disease control. Science Advances 9(31)
- Mena, G., Aburto, J. Unequal impact of the COVID-19 pandemic in 2020 on life expectancy across urban areas in Chile: a cross-sectional demographic study BMJ Open.
- Mena, G., Martinez, P, Ayesha Mahmud, A., Buckee, O., Santillana, M. Socioeconomic status determines COVID-19 incidence and related mortality in Santiago, Chile Science, 372(6545).
- Yemini, E., Lin, A., Nejatbakhsh, A., Varol, E., Sun, R. Mena, G., Samuel, D.T. Paninski, L. Venkatachalam, V. Oliver, H. NeuroPAL: A Neuronal Multicolor Atlas of Landmarks for Whole-Brain Imaging in C.elegans. Cell, Volume 184, Issue 1, 7 January 2021, Pages 272-288.e11
- Mena, G., Grosberg, L., Hottowy, P., Litke, A., Cunningham, J., Chichilnisky E.J. & Paninski, L. Electrical Stimulus Artifact Cancellation and Neural Spike Detection on Large Multi-Electrode Arrays. PLOS Computational Biology13: e1005842, 2017
- 2014Mena, G. & Paninski, L. On Quadrature Methods for Refractory Point Process Likelihoods, Neural
Computation, Vol. 26, No. 12, 2790-2797, 2014

PEER REVIEWED CONFERENCE PAPERS

- Varol,E., Nejatbakhsh, A., Sun,R. Mena, G., Yemini,E.,Oliver, H., Paninski,L. Statistical Atlas of C.elegans Neurons. 23rd International Conference on Medical Image Computing & Computer Assisted Intervention.(MICCAI)
- ²⁰¹⁹ **Mena, G.**, Varol, E., Nejatbakhsh, A., Yemini,E.,Paninski,L. Sinkhorn permutation variational marginal inference. 2nd Symposium in Advances in Approximate Bayesian Inference.
- Mena, G and Niles-Weed, J. Statistical Bounds for Entropic Optimal Transport: Sample Complexity and the Central Limit Theorem. 33rd Conference on Neural Information Processing Systems (NeuRIPS)
- Shah, N., Madugula, S., Grosberg, L., Mena, G., Tandon, P., Hottowy, P., Sher, Alexander., Litke, A.,
 Mitra, Subhasish, and Chichilnisky, E.J. Optimization of Electrical Stimulation for a High-Fidelity
 Artificial Retina. Nishal P. Shah, Sasidhar. 9th International IEEE/EMBS Conference on Neural
 Engineering (NER), 714-718
- Mena, G., Belanger, D., Linderman, S., Snoek, J. Learning Latent Permutations with Gumbel-Sinkhorn Networks. the Sixth International Conference on Learning Representations (ICLR), arXiv.
 Linderman, S.*, Mena, G.*, Cooper, H., Paninski, L., Cunningham, J. Reparameterizing the Birkhoff
- Polytope for Variational Permutation Inference. Artificial Intelligence and Statistics (AISTATS) arXiv.

Preprints

Mena, G., Nejatbakhsh, A., Varol, E., Niles-Weed, Jonathan. Sinkhorn EM: An Expectation-Maximization algorithm based on entropic optimal transport Working Paper. Preliminary version at Optimal Transport and Machine Learning Workshop, NeuRIPS, 2021.

PUBLISHED COMMENTARY

Ju, N., Biswas, N. **Mena, G.** O'Leary, J., and Pompe, E., Jacob, P. On "A unified framework for de-duplication and population size estimation", by Tancredi, A. Steorts, R. and Liseo, B.Bayesian Analysis, 5.2, 633-682.

PEER REVIEWED CONFERENCE EXTENDED ABSTRACTS AND WORKSHOP PAPERS (SELECTED)

- Temporal dithering of epiretinal stimulation to optimize artificial vision. N.P. Shah, N, Madugula, S, Grosberg L, Mena G., Hottowy P, Dabrowski, W. Sher, A, Litke A, . Mitra,S, Chichilnisky, E.J. The Eye and The Chip
- 2017 Mena, G., Belanger, D., Muñoz, G., Snoek, J. Sinkhorn Networks: Using Optimal Transport Techniques to Learn Permutations. NIPS Workshop in Optimal Transport & Machine Learning. Selected for Spotlight presentation., 2017
- Mena, G.*, Linderman*, S., Belanger, D., Snoek, J., Paninski, L., Cunningham, J. Toward Bayesian permutation inference for identifying neurons in C. elegans. NIPS Workshop on Worm's Neural Information Processing, 2017.
- Mena, G., Grosberg, L., Kellison-Linn, F., Chichilnisky E.J. & Paninski, LLarge-scale Multi-Electrode Array Spike Sorting Algorithm Introducing Concurrent Recording and Stimulation. NIPS Workshop on Statistical Methods for Understanding Neural Systems, 2015.

Theses

- ²⁰¹⁸ **Mena, G.** Statistical Machine Learning methods for the Large Scale Analysis of Neural Data. Columbia University Academic Commons.
- ²⁰¹¹ **Mena, G.** Reflected Stochastic Differential Equations Applied to the Modeling of some Neurobiological Processes Underlying Cognitive Phenomena (Spanish), B.S. Thesis . Academic Repository of University of Chile

Honors, Awards and Fellowships

- ²⁰²³ Honorable mention. Mitchel Prize. International Society of Bayesian Analysis.
- 2021 Outstanding Reviewer Award, NeuRIPS.
- Lockey travel Grant, MLPD division, University of Oxford.
- NeurIPS Spotlight talk, "Statistical Bounds for Entropic Optimal Transport: Sample Complexity and the Central Limit Theorem." With J. Niles-Weed.
- 2018-2020 Harvard Data Science Initiative Postdoctoral Fellow (top 5% applicants).
- ²⁰¹⁸ ICLR Presenter Travel Award.
- 2017 COSYNE Presenter Travel Award.
- ²⁰¹⁶ Minghui Yu Teaching Assistant Award, Columbia University.
- ²⁰¹² Dean's Fellowship GSAS, Columbia University. Full funding of the Ph.D.
- ²⁰¹¹ Fulbright Scholarship for PhD Studies in the US.
- 2005-2009 Outstanding Student (top 5%). University of Chile.

Selected Invited Talks

- 2023 On Model Based Clustering With Entropic Optimal Transport.. International Conference of Statistics and Data Science, Lisbon, Portugal.
- Bayesian Methods for Combining Biased and Unbiased Data. University California, Los Angeles, Statistics Department Seminar.
- Bayesian Methods for Combining Biased and Unbiased Data. University of Massachussets, Ahmerst,
 Biostatistics and Epidemiology Department Seminar.
- 2022 On Model Based Clustering With Entropic Optimal Transport. University of Aarhus, Stochastics Seminar.

- 2022 On Model Based Clustering With Entropic Optimal Transport. Applied Optimal Transport Workshop, Institute for Mathematical and Statistical Innovation (IMSI), Chicago.
- What can a Statistician learn from the analysis of neural data?. University of Illinois at Urbana-Champaign, Department of Statistics.
- 2022 What can a Statistician learn from the analysis of neural data?. University of British Columbia, Department of Statistics.
- 2022 What can a Statistician learn from the analysis of neural data?. Yale University, Department of Data Science and Statistics, Yale University.
- 2022 What can a Statistician learn from the analysis of neural data?. Bocconi University, Department of Decision Sciences.
- 2021 Population and finite-sample properties of the Sinkhorn-EM algorithm. Statistics Seminar. Collegio Carlo Alberto, Torino, Italy.
- 2021 *Computational and Statistical Benefits of Entropic Optimal Transport.* Imperial-Oxford StatML CDT kickstart event. University of Oxford.
- 2021 Socioeconomic status determines COVID-19 incidence and related mortality in Santiago, Chile. UT Austin COVID-19 Modeling Consortium Seminar.
- 2021 Socioeconomic status determines COVID-19 incidence and related mortality in Santiago, Chile. Harvard Center for Comunicable Disease Dynamics (CCDD) meeting.
- 2020 Sinkhorn-EM: an Expectation-Maximization Algorithm based on Optimal Transport. Oxford-Warwick CDT annual workshop.
- ²⁰²⁰ Sinkhorn-EM: an Expectation-Maximization Algorithm based on Optimal Transport.
- Optimal Transport: Regularization and Applications Workshop (OTRA). Columbia University.
- 2020 On The Unreasonably Effectiveness of Sinkhorn Algorithm. Information Theory Lab, Harvard University.
- 2019 On The Unreasonably Effectiveness of Sinkhorn Algorithm. Microsoft Research, New England.
- 2019 On The Unreasonably Effectiveness of Sinkhorn Algorithm.
- Harvard Data Science Initiative Lunch.
- 2018 Statistical Machine Learning Methods for the Analysis of Neural Data.
- IBM Research. Yorktown Heights, NY, USA.
- 2018 Statistical Machine Learning Methods for the Analysis of Neural Data.
- IBM. Research. Cambridge. MA, USA.
- ²⁰¹⁷ Toward Bayesian Permutation Inference for Identifying Neurons in C. elegans.
- Neurotheory Seminar. Columbia University, NY, USA.
- 2017 Gumbel-Sinkhorn Networks.
- Google Brain. Cambridge, MA, USA.
- 2016 *Model-based Spike Identification With Electrical Stimulation Artifacts.* Symposium on Retinal Prosthesis. Stanford University. CA, USA.

Selected Contributed Talks

- 2022 On estimation of infection fatality rates with and without serological data. ISBA World Meeting, Vancouver, Canada.
- *Estimation of infection fatality rates with incomplete data*. End-to-end Bayesian learning International Conference, CIRM, Marseille.
- 2021 *Population and finite-sample properties of the SinkhornEM algorithm.* Schrödinger problem and Mean Fields PDE Conference, CIRM, Marseille.
- 2019 Statistical Bounds for Entropic Optimal Transport: Sample Complexity and the Central Limit Theorem. Spotlight Talk. NeuRIPS, Vancouver.

Teaching

	Lecturer, Department of Statistics, University of Oxford
2021,2022 (Hilary)	Advanced Simulation (Senior undergrad- Msc. level)
	Lecturer (non-stipendiary) Corpus Christi College, University of Oxford
2021	Linear Algebra I and II (prelims)
	Senior Lecturer (non-stipendiary), University College, University of Oxford
2021 Michaelmas	Probability (prelims, part A)
	Instructor, Statistics Department, Columbia University
2015	Introduction to Statistics with Calculus (undergraduate level).
	TEACHING FELLOW, SCHOOL OF ENGINEERING AND APPLIED SCIENCES, HARVARD UNIVERSITY
2019	Capstone Research Project Course.
	TEACHING ASSISTANT, STATISTICS DEPARTMENT, COLUMBIA UNIVERSITY
2012-2017	Neural Data Analysis (PhD. level), Computational Statistics (PhD. level), Probability and Statistic Inference (M.A. level), Introduction to Statistics Without Calculus (undergrad level), Data Min- ing (M.A. level), Introduction to Probability and Statistics (M.A. level), Statistical Inference (M.A. level), Stochastic Processes and Applications (M.A. level), Probability (M.A. level), Probability and Statistics (M.A. level).
	Teaching Assistant, School of Engineering, Universidad de Chile
2006-2009	Stochastic Calculus (M.Sc. level), Markov Processes (M.Sc. level), Probability and Statistics (un- dergrad level), Linear Algebra (undergrad level), Multivariate Calculus (undergrad level), Elemen- tary Algebra (undergrad level), Elementary and advanced Calculus (undergrad level), Mathematics Summer School for High School Students.

Supervision

- ²⁰²³ Yuxiong Gao. Msc in Statistical Science, University of Oxford. Dissertation supervisor. Thesis name: 'Estimating the Number of Clustering Components with Sinkhorn EM'
- ²⁰²³ Dario Shariatian. Msc in Statistical Science, University of Oxford. Dissertation supervisor. Thesis name: 'A Robust Alternative to the Log-Likelihood with Entropic Optimal Transport'
- Andra Mircea and Jacqueline Rao. University of Oxford. Statistics Summer Research Internships project 'Understanding the post-pandemic evolution of mental health problems in adolescents'.
- ²⁰²² Chijing Zeng. Msc in Statistical Science, University of Oxford. Dissertation supervisor. Thesis name: New model-based clustering methods for spatially-resolved transcriptomics based on entropic optimal transport.
- ²⁰²² Dyon Cong. Msc in Statistical Science, University of Oxford. Dissertation supervisor. Thesis name: Assessing the representativeness of COVID-19 related surveys in the UK.
- Deivis Banys. Msc in Statistical Science, University of Oxford. Dissertation supervisor. Thesis name: Scalable optimal transport methods for unsupervised cross-lingual representation learning.
 Andrew Campbell. StatML CDT (Oxford/Imperial) project supervisor. Project name: Generative

Sinkhorn Networks

Zhongren Chen. Independent summer research supervisor (Undergraduate, St. Hilda College, University of Oxford). Project name: small-area infection fatality rate estimation.
 Hancheng Bi. Independent summer research supervisor (Undergraduate, St. Hilda College, University of Oxford). Project name: small-area infection fatality rate estimation.

Professional Service and Memberships

JOURNAL REVIEWING

IEEE Transactions on Pattern Analysis and Machine Intelligence, Vienna Yearbook of Population Research, JAMA Internal Medicine, Epidemiology, Journal of the American Statistical Association, Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences, Entropy, Journal of Machine Learning Research, Information and Inference, Journal of Neuroscience Methods. PLOS Neglected Tropical Diseases, BMJ Open.BMJ Global Health.

CONFERENCE REVIEWING

AAAI, ICML, ICLR, AABI, NeuRIPS, AISTATS.

Other Peer evaluation

Banff International Research Station for Mathematical Innovation and Discovery (workshop evaluation), Harvard Data Science Initiative (Postdoctoral fellow research fund evaluation).

Organizing

Oxford Computational Statistics and Machine Learning Seminar, University of Oxford (2020-2022), Computational Statistics Reading Group, Harvard University (2019).

ACADEMIC SERVICE

Equality, Diversity and Inclusion Committee. Department of Statistics, University of Oxford
 Center for Mathematical Modeling (CMM, Chile), COVID-19 response team.

PROFESSIONAL MEMBERSHIPS

²⁰²¹⁻ Institute of Mathematical Statistics, Bernoulli Society, International Society for Bayesian Analysis.

OTHER MEMBERSHIPS

Middle Common Room Postdoc member. Jesus College, University of Oxford. Technical Committee on the Future of Labor, hosted by the Chilean Senate (2020)

Other

²⁰²¹⁻ Certified as mental-health first aider (online), MHFA England

Skills

Programming languages: Python, R, Matlab, Java Other Computational Skills:Git, ITEX