

Dougal J. Sutherland

Contact Information

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Academic Positions and Education

- 2016– **Research Associate**, *Gatsby Computational Neuroscience Unit, University College London*.
Postdoctoral position with Arthur Gretton.
- 2016 **Ph.D., Computer Science**, *Carnegie Mellon University*.
Thesis Title: Scalable, Flexible, and Active Learning on Distributions.
Committee: Jeff Schneider (chair), Barnabás Póczos, Maria-Florina Balcan, Arthur Gretton.
- 2015 **M.S., Computer Science**, *Carnegie Mellon University*.
- 2011 **B.A., Computer Science**, *Swarthmore College*, with high honors.
Minors in Linguistics (with high honors) and Mathematics & Statistics. GPA: 3.92.

Honors and Awards

- 2014 – 2016 Sandia Campus Executive Program fellowship. (Renewed in 2015.)
- 2013 National Science Foundation Graduate Research Fellowship Program: Honorable Mention.
- 2011 Ivy Award for “the senior man outstanding in leadership, scholarship, and contributions to the college community” by Swarthmore faculty vote.
- 2011 Elected Phi Beta Kappa.
- 2011 Drew Pearson Prize for excellence in journalism.

Research and Academic Experience

- 2013 – 2016 **XDATA workshops, DARPA**.
Analyzed various datasets with teams from across academia and industry as a testbed for development of open-source data-analytic software libraries. Developed a Python library, `skl-groups`, for machine learning on distributions. Participated in development of a financial analysis application in use at a federal agency. Led a small team of CMU participants and managed collaborations.
- 2011 – 2016 **Ph.D. research, Carnegie Mellon University**.
Research in machine learning with Jeff Schneider; frequent collaboration with Barnabás Póczos. Particular focus on machine learning on samples from distributions and on active learning problems. In addition to work represented by the publications below, I did unpublished empirical work related to learning on distributions in the analysis of financial anomalies, fusion reactor behavior, web browsing traffic, shipping behavior, terrorist activities, and Twitter language use.
- Spring 2011 **Linguistics senior honors study, Swarthmore College**.
Analyzed the phonotactics of Chaha, including computational approaches, for Colleen Fitzgerald.
- Summer 2010 **REU in machine learning, University of Oklahoma**.
Worked on a relational concept learning system with Andrew Fagg.
- Summer 2009 **Howard Hughes Medical Institute fellowship, Swarthmore College**.
Worked on natural language processing and medical information extraction with Rich Wicentowski.

Spring 2009 **Directed independent study project**, *Pitzer in Nepal*.

Examined the interaction of language use and pedagogical techniques in rural Nepali schools.

Publications

Below, * denotes equal contribution.

Preprints

Michael Arbel, Dougal J. Sutherland, Mikołaj Bińkowski, and Arthur Gretton. *On gradient regularizers for MMD GANs*. 2018. arXiv: 1805.11565.

Journal and low-acceptance-rate conference papers

- Mikołaj Bińkowski*, Dougal J. Sutherland*, Michael Arbel, and Arthur Gretton. "Demystifying MMD GANs." In: *International Conference on Learning Representations (ICLR)*. 2018. arXiv: 1801.01401.
- Dougal J. Sutherland*, Heiko Strathmann*, Michael Arbel, and Arthur Gretton. "Efficient and principled score estimation with Nyström kernel exponential families." In: *Artificial Intelligence and Statistics (AISTATS)*. 2018. arXiv: 1705.08360. Selected for oral presentation.
- Ho Chung Leon Law*, Dougal J. Sutherland*, Dino Sejdinovic, and Seth Flaxman. "Bayesian Approaches to Distribution Regression." In: *Artificial Intelligence and Statistics (AISTATS)*. 2018. arXiv: 1705.04293.
- Dougal J. Sutherland, Hsiao-Yu Tung, Heiko Strathmann, Soumyajit De, Aaditya Ramdas, Alex Smola, and Arthur Gretton. "Generative Models and Model Criticism via Optimized Maximum Mean Discrepancy." In: *International Conference on Learning Representations (ICLR)*. 2017. arXiv: 1611.04488.
- Michelle Ntampaka, Hy Trac, Dougal J. Sutherland, Sebastian Fromenteau, Barnabás Póczos, and Jeff Schneider. "Dynamical Mass Measurements of Contaminated Galaxy Clusters Using Machine Learning." In: *The Astrophysical Journal* 831.2 (2016), p. 135. arXiv: 1509.05409.
- Dougal J. Sutherland*, Junier B. Oliva*, Barnabás Póczos, and Jeff Schneider. "Linear-time Learning on Distributions with Approximate Kernel Embeddings." In: *AAAI Conference on Artificial Intelligence (AAAI)*. 2016. arXiv: 1509.07553.
- Dougal J. Sutherland and Jeff Schneider. "On the Error of Random Fourier Features." In: *Uncertainty in Artificial Intelligence (UAI)*. 2015. arXiv: 1506.02785.
- Yifei Ma*, Dougal J. Sutherland*, Roman Garnett, and Jeff Schneider. "Active Pointillistic Pattern Search." In: *Artificial Intelligence and Statistics (AISTATS)*. 2015.
- Michelle Ntampaka, Hy Trac, Dougal J. Sutherland, Nicholas Battaglia, Barnabás Póczos, and Jeff Schneider. "A Machine Learning Approach for Dynamical Mass Measurements of Galaxy Clusters." In: *The Astrophysical Journal* 803.2 (2015), p. 50. arXiv: 1410.0686.
- Dougal J. Sutherland, Barnabás Póczos, and Jeff Schneider. "Active learning and search on low-rank matrices." In: *Knowledge Discovery and Data Mining (KDD)*. 2013. Selected for oral presentation.
- Barnabás Póczos, Liang Xiong, Dougal J. Sutherland, and Jeff Schneider. "Nonparametric kernel estimators for image classification." In: *Computer Vision and Pattern Recognition (CVPR)*. 2012.
- Andrew Stromme, Dougal J. Sutherland, Alexander Burka, Benjamin Lipton, Nicholas Felt, Rebecca Roelofs, Daniel-Elia Feist-Alexandrov, Steve Dini, and Allen Welkie. "Managing User Requests with the Grand Unified Task System (GUTS)." In: *Large Installation System Administration (LISA)*. 2012.

Peer-reviewed workshop and high-acceptance-rate conference contributions

- Ho Chung Leon Law*, Dougal J. Sutherland*, Dino Sejdinovic, and Seth Flaxman. "Bayesian Approaches to Distribution Regression." In: *Learning on Distributions, Functions, Graphs and Groups (NIPS workshop)*. 2017. Selected for oral presentation.
- Jay Jin, Kyle Miller, Dougal J. Sutherland, Simon Labov, Karl Nelson, and Artur Dubrawski. "List Mode Regression for Low Count Detection." In: *IEEE Nuclear Science Symposium (IEEE NSS/MIC)*. 2016.

Dougal J. Sutherland*, Junier B. Oliva*, Barnabás Póczos, and Jeff Schneider. “Linear-time Learning on Distributions with Approximate Kernel Embeddings.” In: *Feature Extraction: Modern Questions and Challenges (NIPS workshop)*. 2015.

Yifei Ma*, Dougal J. Sutherland*, Roman Garnett, and Jeff Schneider. “Active Pointillistic Pattern Search.” In: *Bayesian Optimization (NIPS workshop)*. 2014.

Dissertations

Dougal J. Sutherland. “Scalable, Flexible, and Active Learning on Distributions.” Ph.D. thesis. Carnegie Mellon University, 2016.

Dougal J. Sutherland. “Integrating Human Knowledge into a Relational Learning System.” B.A. thesis. Swarthmore College, 2011.

Technical reports

Dougal J. Sutherland. *Fixing an error in Caponnetto and de Vito (2007)*. 2017. arXiv: 1702.02982.

Seth Flaxman, Dougal J. Sutherland, Yu-Xiang Wang, and Yee Whye Teh. *Understanding the 2016 US Presidential Election using ecological inference and distribution regression with census microdata*. 2016. arXiv: 1611.03787.

Junier B. Oliva*, Dougal J. Sutherland*, Barnabás Póczos, and Jeff Schneider. *Deep Mean Maps*. 2015. arXiv: 1511.04150.

Dougal J. Sutherland, Liang Xiong, Barnabás Póczos, and Jeff Schneider. *Kernels on Sample Sets via Nonparametric Divergence Estimates*. 2012. arXiv: 1202.0302.

Junier B. Oliva, Dougal J. Sutherland, and Yifei Ma. *Finding Representative Objects with Sparse Modeling*. CMU 10-725 Optimization course project. 2012. Best poster award.

Matthew Bodenhamer, Thomas Palmer, Dougal J. Sutherland, and Andrew H. Fagg. *Grounding Conceptual Knowledge with Spatio-Temporal Multi-Dimensional Relational Framework Trees*. 2012.

Invited Talks

Jun 2018 *Better GANs by using the MMD*.
Facebook AI Research New York.

Jun 2018 *Efficiently Estimating Densities and Scores with Kernel Exponential Families*.
Gatsby Tri-Center Meeting.

Jun 2018 *Better GANs by using the MMD*.
Machine Learning reading group, Google New York.

Jun 2018 *Better GANs by using the MMD*.
Machine Learning reading group, Columbia University.

May 2018 *Advances in GANs based on the MMD*.
Machine Learning Seminar, University of Sheffield.

Dec 2017 *Efficient and principled score estimation with kernel exponential families*.
Approximating high dimensional functions (Alan Turing Institute workshop).

Dec 2017 *Efficient and principled score estimation with kernel exponential families*.
Computational Statistics and Machine Learning seminar, University College London.

Aug 2017 *Evaluating and Training Implicit Generative Models with Two-Sample Tests*.
Implicit Models (ICML workshop).

Apr 2017 *Two-Sample Tests, Integral Probability Metrics, and GAN Objectives*.
The Theory of Generative Adversarial Networks (DALI workshop).

Feb 2017 *Generative Models and Model Criticism via Optimized Maximum Mean Discrepancy*.
Computational Statistics and Machine Learning seminar, Oxford University.

Teaching Experience

- Spring 2014 **Teaching Assistant**, *15-853 Algorithms in the Real World*, Carnegie Mellon University.
Ph.D.-level course on algorithms with real-world applications. (Guy Blelloch and Anupam Gupta)
- Fall 2013 **Teaching Assistant**, *10-701 Machine Learning*, Carnegie Mellon University.
Introductory Ph.D.-level course in machine learning. (Alex Smola and Geoff Gordon)
- Summer 2011 **Teaching Assistant and Residential Mentor**, *Summer Science Program*, ssp.org.
Assisted rising high school seniors from around the world in an intense five-week residential program. Students determined the orbit of a near-Earth asteroid based on their own observations, as well as learning the necessary computer programming, vector calculus, and astronomy to do so.
- 2009 – 2011 **Editor-in-Chief**, *The Daily Gazette*, Swarthmore.
Supervised staff in writing and editing news stories, as well as managing all newspaper operations.
- 2008 – 2011 **Lead Web Developer**, *The Daily Gazette*, Swarthmore.
Led small teams in developing an award-winning newspaper site and a campus announcement site.

Service

- 2015 – **Program committee or equivalent**, *NIPS, ICML, ICLR, AAAI*.
ICML 2018: Outstanding Reviewer.
- 2014 – **Reviewer**, *JMLR, IEEE TSP, IEEE T-PAMI, Springer MLJ, COLT, SoCG, IJCAI, ECML-PKDD*.
- 2017 **Session chair**, *ICML*.
- 2016 – **External seminar organizer**, *Gatsby*.
- 2013 **Immigration Course organizer**, *CMU*.
- 2015 – **Top 50 annual contributor**, *Cross Validated*, stats.stackexchange.com.
- 2018 – **Core member**, conda-forge.org, scientific software packaging ecosystem.

Graduate Coursework

CMU	F2013	Deep Learning	B Raj	A
CMU	S2013	Optimizing Compilers for Modern Architectures	T Mowry	A
CMU	F2012	Optimization	G Gordon, R Tibshirani	A+
CMU	F2012	Intermediate Statistics	L Wasserman	A+
CMU	S2012	Graduate Algorithms	M Blum	A-
CMU	S2012	Semantics of Programming Languages	S Brookes	A
CMU	F2011	Machine Learning	E Xing	A+
CMU	F2011	Computational Models of Neural Systems	D Touretzky	A
UPenn	S2010	Software Foundations	B Pierce	A+

Other

- Programming Thorough knowledge of standard Python scientific and deep learning libraries. Experienced with C/C++, Matlab, and web languages.
- Languages Native English; practical Nepali; coursework in Chinese, Arabic, ASL, and Latin.
- Citizenship U.S.

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