Matthew R. O'Shaughnessy

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RESEARCH INTERESTS

Machine learning, causal inference, compressed sensing and low-dimensional structure in inference, dynamics and dynamical systems

EDUCATION

Ph.D. Electrical & Computer Engineering August 2016 — Present
Georgia Institute of Technology, Atlanta, GA
Supported by NDSEG Fellowship, 2017–2021
Co-Advisors: Prof. Mark Davenport, Prof. Christopher Rozell
Thesis: "Structure, Causality, and Dynamics in Statistical Inference"

M.S. Mathematics December 2019
Georgia Institute of Technology, Atlanta, GA

B.S. Electrical Engineering May 2016
Georgia Institute of Technology, Atlanta, GA
Designations: Highest Honors, Research Option, Co-op Option

WORK EXPERIENCE

MIT Lincoln Laboratory Summer 2016
Open and Embedded Systems Group (102)

Georgia Tech Research Institute Summer 2014, Spring 2015, Fall 2015
Electro-Optical Systems Lab *(full time, three semesters)*

Boeing Company Summer 2015
DSP Algorithms Group, Boeing Satellite Systems

TEACHING EXPERIENCE

Undergraduate Student Supervision
Mark Faingold 2019 — 2020
Opportunity Research Scholars (ORS) program

Miguel Garcia 2019 — 2020
Opportunity Research Scholars (ORS) program
President's Undergraduate Research Award (PURA)

Jason Palmer 2019 — 2020
Opportunity Research Scholars (ORS) program

Undergraduate Teaching Assistant August 2013 — May 2016
Recitation instructor, CS 1371 (Computing for Engineers) (*6 semesters*)
Senior TA and Tech Team lead, 2015–2016

JOURNAL PUBLICATIONS

[J1] **M. O'Shaughnessy**, M. Davenport, and C. Rozell, "Sparse Bayesian Learning with Dynamic Filtering for Inference of Time-Varying Sparse Signals," *IEEE Transactions on Signal Processing*, December 2019.

CONFERENCE PUBLICATIONS

[C8] **M. O'Shaughnessy**, G. Canal, M. Connor, M. Davenport, and C. Rozell, "Generative Causal Explanations of Black-Box Classifiers," *Submitted*, June 2020.

[C7] G. Canal, M. Connor, J. Jin, N. Nadagouda, **M. O'Shaughnessy**, C. Rozell, and M. Davenport, "The PICASSO Algorithm for Bayesian Localization via Paired Comparisons in a Union of Subspaces Model," in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Barcelona, Spain, May 2020.

[C6] P. Brown, **M. O'Shaughnessy**, C. Rozell, J. Romberg, and M. Flynn, "A 17.8MS/s Neural-Network Compressed Sensing Radar Processor in 16nm FinFET CMOS," in *Proc. IEEE Custom Integrated Circuits Conf. (CICC)*, Boston, MA, March 2020.

[C5] **M. O'Shaughnessy**, M. Davenport, and C. Rozell, "Dynamical System Implementations of Sparse Bayesian Learning," in *Proc. IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Guadeloupe, West Indies, December 2019.

[C4] G. Canal*, **M. O'Shaughnessy*** (equal contribution), C. Rozell, and M. Davenport, "Joint Estimation of Trajectory and Dynamics from Paired Comparisons," in *Proc. IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Guadeloupe, West Indies, December 2019.

[C3] **M. O'Shaughnessy**, M. Davenport, and C. Rozell, "Robust Incorporation of Signal Predictions into the Sparse Bayesian Learning Framework," In *Proc. IEEE Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS)*, Toulouse, France, July 2019.

[C2] **M. O'Shaughnessy** and M. Davenport, "Localizing Users and Items from Paired Comparisons," In *Proc. IEEE Int. Workshop on Machine Learning for Signal Processing (MLSP)*, Vietri sul Mare, Salerno, Italy, September 2016.

[C1] R. Ortman, D. Carr, R. James, D. Long, **M. O'Shaughnessy**, C. Valenta, and G. Tuell, "Real-time, Mixed-mode Computing Architecture for Waveform-resolved Lidar Systems with Total Propagated Uncertainty," in *Proc. SPIE Defense and Commercial Sensing*, Baltimore, Maryland, April 2016.

OTHER TECHNICAL PUBLICATIONS

[O5] **M. O'Shaughnessy**, "Security Implications of Machine Learning Enabled Disinformation," in *Innovate for Future Threats: Disruptive Innovation Efforts and Uses of the Technology Environment by State and Non-state Actors*, May 2020.

[O4] **M. O'Shaughnessy**, "Localizing Embeddings for Recommendation Systems using Binary Paired Comparisons," *Undergraduate Thesis*, Georgia Institute of Technology, May 2016.

[O3] G. Tuell, D. Carr, N. Guida, **M. O'Shaughnessy**, "Strategies for Mitigating Sea Surface Effects in the Workflow of Deployed Topo-Bathy Lidar Systems," *Technical Report to NOAA*, September 2015.

[O2] G. Tuell, D. Carr, N. Guida, **M. O'Shaughnessy**, "On the Relationship between Resolution of Sea Surface DEMs and Accuracy of Refracted Angle based on Analysis of Empirical Data," *Technical Report to NOAA*, July 2015.

[O1] G. Tuell, D. Carr, N. Guida, **M. O'Shaughnessy**, "Procedures and Algorithms for Raytracing Lidar Measurements Through an Irregular Sea Surface," *Technical Report to NOAA*, May 2015.

PATENTS

[P1] **M. O'Shaughnessy**, G. Canal, M. Connor, M. Davenport, and C. Rozell, "Generative Causal Explanations of Black-Box Classifiers." U.S. Provisional Patent Application No. 63/043,331. Filed June 2020.

EDITORIALS

[E1] **M. O'Shaughnessy**, "Opinion: Deporting International Students if Classes Go Online Hurts U.S. Colleges and Economy," *The Atlanta Journal-Constitution*, July 9, 2020.

AWARDS

National Defense Science & Engineering Graduate (NDSEG) Fellowship, 2017—2021
Sam Nunn Security Program Fellow, 2019—2020
Georgia Tech President's Undergraduate Research Award, 2015
3rd Place, Opportunity Research Scholars Poster Contest, 2014
2nd Place, Opportunity Research Scholars Poster Contest, 2013
Kelley Family Music Scholarship, 2013
National Merit Scholarship, 2012—2016
Zell Miller Scholarship, 2012—2016
Georgia Tech Dean's List; Faculty Honors, 2012—2016

REVIEWER SERVICE

IEEE Transactions on Signal Processing, 2018, 2019, 2020
IEEE Wireless Communication Letters, 2020
Workshop on Signal Processing with Adaptive Sparse Structured Representations (SPARS), 2019
Georgia Tech President's Undergraduate Research Award, 2016, 2017, 2018, 2019, 2020

OTHER SERVICE

Guest Lecturer, *Machine learning in 90 minutes*, Georgia Tech MBA Class, 2020
Organizer, Children of the Norm Group Meeting, 2019 — Present
Mentor, School of ECE Graduate Student Organization, 2019
Website Developer, GT Center for Signal & Information Processing, 2018
Member, Center for Signal & Information Processing Student Activities Committee
ECE Section Editor, The Tower Undergraduate Research Journal, 2015–2016
Treasurer, Society for Photonics & Optics, Georgia Tech Student Chapter, 2015