Gabriel Arpino

CONTACT INFORMATION

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https://gabrielarpino.github.io

EDUCATION

University of Cambridge, UK
PhD in Engineering, 2021 — Present

- PhD Thesis on Statistical Learning — advised by Prof. Ramji Venkataramanan

ETH Zürich, Switzerland
M.Sc. in Electrical Engineering and Information Technology, 2019 — 2021

- M.Sc. Thesis: *"Computational Hardness of Sparse High-Dimensional Linear Regression"* — advised by Prof. Afonso Bandeira

University of Toronto, Canada
B.A.Sc. in Engineering Science (with Honours), 2014 — 2019

- B.A.Sc. Thesis: *"Tightening PAC-Bayes Bounds using Data-Dependent Priors"* — advised by Prof. Daniel Roy

RESEARCH INTERESTS

Statistical learning, probability, information theory, optimization, computation.

PUBLICATIONS

Gabriel Arpino, Xiaoqi Liu, Ramji Venkataramanan (2023). "Changepoint Inference in High-Dimensional Regression". *In preparation.*

Gabriel Arpino, Ramji Venkataramanan (2023). "Statistical-Computational Tradeoffs in Mixed Sparse Linear Regression". *Conference on Learning Theory (COLT), 2023.*

Gabriel Arpino, Daniil Dmitriev, Nicolo Grometto (2023). "Greedy Heuristics and Linear Relaxations for the Random Hitting Set Problem". *In review.*

Gabriel Arpino, Nicolo Grometto, Afonso Bandeira (2020). "Group Testing in the High Dilution Regime". *International Symposium on Information Theory (ISIT) 2021.*

Gintare Karolina Dziugaite, Kyle Hsu, Waseem Gharbieh, **Gabriel Arpino**, Daniel M. Roy (2020). "On the role of data in PAC-Bayes bounds". *Artificial Intelligence and Statistics Conference (AISTATS), 2021.*

Gintare Karolina Dziugaite, **Gabriel Arpino**, and Daniel Roy (2018). "Towards generalization guarantees for SGD: Data-dependent PAC-Bayes priors". *2018 Neural Information Processing Systems (NeurIPS) Workshop on Bayesian Deep Learning.*

Gabriel Arpino, Kyle Morris, Sasanka Nagavalli, Katia Sycara (2018). "Using Information Invariants to Compare Swarm Algorithms and General Multi-Robot Algorithms". *2018 IEEE International Conference on Robotics and Automation (ICRA).*

Kyle Morris, **Gabriel Arpino**, Sasanka Nagavalli, Katia Sycara (2017). "Full Stack Swarm Architecture". *RISS Working Papers Journal 2017.*

Johnathon N. Caguiat, **Gabriel Arpino**, Sally G. Krigstin, Donald W. Kirk, Charles Q. Jia (2018). "Dependence of supercapacitor performance on macro-structure of monolithic biochar electrodes". *Biomass and Bioenergy.*

AWARDS

- Cambridge Trust Fellowship to study at Gonville & Caius College, University of Cambridge
- Scholarship to join the Intelligent Co-ordination and Logistics Lab as part of the Robotics Institute Summer Scholars (RISS) program
- University of Toronto 2017 Scholar Award for academic performance

Research Experience

Invenia Labs
Junior Researcher, September 2017 — September 2018

- Led the development of gaussian process models for performing statistical inference on over 10 gigabytes of electricity market data, improving prediction accuracy by over 55% over previous models
- Composed statistical kernels for gaussian process forecasting in the electricity market, resulting in forecast accuracies beating the state of the art
- Developed AWS cloud and GPU infrastructure to run models on over 10 gigabytes of data

Robotics Institue, Carnegie Mellon University
RISS Researcher, May 2017 — September 2017

- Led a team of researchers through the development of a paper on information invariants in multi-agent robotic systems, accepted as a conference paper to ICRA 2018, supervised by Prof. Katia Sycara
- Developed a novel full-stack swarm robot control architecture implemented and tested on ROS, leading to the publication of a paper at the RISS 2017 Working Papers Journal and achieving over 95% reproduction accuracy on real-world simulations

CEAR Lab, Technion - Israel Institute of Technology
Researcher, May 2016 — September 2016

- Implemented 3D SLAM localization algorithms in C++ onto Clearpath Field Robots, resulting in the creation of accurate point cloud representations of $100m^2$ orchards, supervised by Prof. Amir Degani
- Refined robotic vision algorithms in C++ and Python using ROS and PCL for orchard tree identification, resulting in robust code that identified 90% of orchard tree clusters

Green Technology Laboratory, University of Toronto
Researcher, March 2015 — September 2015

- Developed procedures for the performance testing of biochar supercapacitors, leading to a Biomass and Bioenergy Journal publication supervised by Prof. Charles Q. Jia

Invited Talks/Posters

- *Statistical-Computational Tradeoffs in Mixed Sparse Linear Regression*, ETH Zürich DACO seminar, October 2023.
- *Dilution Group Testing: Novel Bounds via Practical Decoders*, Professor Helmut Bölcskei's lab seminar, ETH Zürich. June 2020.
- *Noisy Group Testing: Achievable Rates*, Professor Afonso Bandeira's lab seminar, ETH Zürich. April 2020.

Graduate Courses

Mathematical Statistics, Probability Theory, Information Theory, Functional Analysis, Advanced Machine Learning, Computational Complexity, Measure Theory, Control Theory, Empirical Processes, Optimization, Neural Network Theory.

Languages

- Portuguese, English, Italian, French, Spanish
- C++, Python (Numpy, Jax, Tensorflow, Pytorch), Julia, MATLAB, Verilog

Extra Curricular

Jazz musician and leader, having performed and led bands at the professional level on upright and electric bass in venues such as *The Rex* in Toronto, *Hot Numbers* in Cambridge, UK, *Moods* and *Lebewohlfabrik* in Zürich.