Juan Kuntz Nussio

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https://juankuntz.github.io/

Profile

Versatile **Research Scientist** with

- a knack for working across disciplines and a **broad background** in mathematics, computer science, and engineering;
- ample experience in **statistics**, **machine learning**, **Monte Carlo**, **optimization**, and **control theory**;
- proficiency in **Python** and a keen interest in software development;
- and **ten years** of experience in academic **research**.

Scientific Skills

Statistics: Frequentist and Bayesian inference, point estimation, hypothesis testing, asymptotics, bootstrapping, interval estimation, linear regression and GLMs, ensemble methods (bagging, Bayesian averaging, boosting), experimental design, variational inference, expectation-maximization, empirical Bayes, hidden Markov models, and filtering/smoothing.

Machine learning:

- supervised learning (nearest neighbours, L/QDA, SVMs, decision trees, random forests, etc.),
- unsupervised learning (PCA, k-means, factor analysis, sparse coding, etc.),
- deep learning (RNNs, LSTM, CNNs, autoencoders, transformers),
- statistical learning theory (risk minimization, cross-validation, bias-variance tradeoff, double descent),
- regularization (early stopping, Tikhonov, L_1, dropout, data augmentation),
- reinforcement learning (bandits, dynamic programming, TD learning, actor-critic methods),
- computer vision (diffusion models, VAEs, GANs),
- NLP (word embeddings, language models, sentiment analysis, seq2seq models).

Monte Carlo: Rejection sampling, importance sampling, Markov chain Monte Carlo, annealed importance sampling, sequential Monte Carlo, pseudo-marginal methods, variance reduction techniques, and likelihood-free methods.

Optimization: Standard convex programs (LPs, SDPs, etc.), primal-dual formulations, first-order methods, stochastic optimization, proximal algorithms, higher-order methods, algorithms for constrained optimization (IPMs, ADMM, etc.), and derivative-free methods (coordinate descent, Bayesian optimization, simulated annealing, genetic algorithms, etc.).

Applied mathematics: Dynamical systems and control theory (linear systems, Lyapunov stability, linearization, optimal control, robust control, etc.), numerical analysis, systems biology, probability theory, optimal transport, differential geometry, Markov processes, stochastic calculus, and measure theory.

Engineering Skills

Python (numpy, PyTorch, JAX, pandas, scikit-learn, statsmodels, Pyro, matplotlib, SciPy), Git, Linux, SQL, MATLAB, LaTeX.

Work Experience

Postdoctoral Research Fellow. *Department of Statistics, University of Warwick, UK.* Apr 2020 – today

Postdoctoral Research Associate. *Department of Bioengineering, Imperial College London, UK.* Nov 2017 – Jun 2019

Research Assistant. Mar 2017 – Aug 2017,
Departments of Bioengineering, Chemistry, and Mathematics, Oct 2016 – Feb 2017,
Imperial College London, UK. Jan 2015 – Jun 2015

Education

Ph.D. in Bioengineering and Mathematics. *Imperial College London, UK.*, BBSRC funded. Oct 2012 – Oct 2017
Thesis: "Deterministic approximation schemes with computable errors for the distributions of Markov chains".

M.Eng. in Biomedical Engineering. *Imperial College London, UK.* Oct 2008 – Jul 2012

- Integrated Masters degree (Bachelors + Masters) with a one-year specialization in Control Engineering. Graduated with First-Class Honours (ranked second in year group).

Publications

13 academic publications including **10 first-author articles** and **a book**; see my website for a searchable list with subject tags. ***h*-index** of **8** and **161 total citations**, as indicated by Google Scholar in Jan. 2023. Latest publications:

- **J. Kuntz**, J. N. Lim, and A. M. Johansen. "Particle algorithms for maximum likelihood training of latent variable models". *AISTATS* (2023, accepted).
- **J. Kuntz**, F. R. Crucinio, and A. M. Johansen. "Product-form estimators: exploiting independence to scale up Monte Carlo". *Statistics and Computing* 32.12 (2022).