Aditya **Ravuri**

PhD Student · Statistician

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Education

University of Cambridge
Cambridge, UK

PhD in Computer Science, **Probabilistic Machine Learning**
Oct. 2021 - Present

- Focusing on unifying probabilistic interpretations of unsupervised dimensionality reduction methods in single cell genomics, with a focus on interpretability and identifiability. Concurrently also working on a wide range of case studies of science-constrained unsupervised learning across climate science and biology. Supervised by Prof. Neil Lawrence and funded by the Accelerate Programme for Scientific Discovery.
- Responsibilities include group roles and project supervisions. Helped with Dagstuhl 2022.

University of Cambridge
Cambridge, UK

MPhil in Management
Oct. 2016 - Jun. 2017

- Commendation (70%). **Focus:** Strategic Valuation (top prize), Economics. **Audits:** Measure Theory, Philosophy of Science, Physics.
- Jaguar Land Rover consulting project: Modeled the contribution of JLR to the UK economy in a highly collaborative setting. Conducted original research on improving the accuracy of input-output multipliers. Highly commended for the work and presentation.
- Coloplast Internship (Aug. '17): Aided implementation of a time series forecasting model (involving splines, linear filters and ARIMA error processes) and automated model fitting.

Heriot-Watt University
Edinburgh, UK

BSc Hons in Actuarial Science, **Statistics Major**
Sep. 2013 - Jun. 2016

- **Awards:** Distinction (83%) (top 3%), CT1-8, Volunteering - Bronze (ChessSoc President, Student Union Exec, Mentor). Obtained BSc at age 18.
- **Focus:** Statistics, Quantitative Risk Management, Mathematical Finance. Project Areas: GARCH models, copulas, extreme value theory, stochastic calculus, liquidity risk, economic scenario generators and advanced statistical inference. Published in the actuarial magazine.

Skills

Programming	R, Python, Stan, PyTorch, Tensorflow
Languages	English, Japanese (basic), French (basic), Hindi, Telugu
Other	ggplot, data.table, Rcpp, sparklyr, git, LaTeX, astrophotography, other PPLs

Contributions

Web	falmity.com: Personal projects (e.g. speech synthesis using Gaussian processes) and minimal examples (e.g. GAMs as sparse GPs, the Griffin-Lim algorithm, state-space models). Stats Stack Exchange: top 2% contributor in 2018.
Code	Contributed to scipy (an efficient Toeplitz matrix-vector product function), geometric-kernels (kernels on graphs), gauche (kernels on spaces of graphs), sympy, torch, gpy and gpytorch. Wrote code for the papers below, including (torch, tf and stan based) packages for working with scalable GPLVMs, GPLVMs with normalizing flows and a probabilistic framework for ice core dating for the British Antarctic Survey. Currently also working on code for Bayesian optimisation over proteins.

Papers

Please see google scholar for an up-to-date list. Four workshop papers are currently in preparation, around Titi monkey call identification and classification, protein thermostability prediction, IMA in GPs and an extension of our scRNA software. First and second author papers are below.

1. **Ravuri, A.**, Lalchand V., Vargas, F. and Lawrence, N. D. (2023, preprint available here). *Dimensionality Reduction as Probabilistic Inference*.

2. Lalchand V.*, **Ravuri A.***, Dann E. M.* et. al. (2022). *Modelling Technical and Biological Effects in scRNA-seq data with Scalable GPLVMs*, accessible here (MLCB Oral 2022).

3. Griffiths R. R.*, Klarner L.*, Moss H. B.*, **Ravuri A.***, Truong S.* et. al. *GAUCHE: A Library for Gaussian Processes and Bayesian Optimisation in Chemistry*, accessible here (AI4Science & ReALML ICML Workshops 2022).

4. Lalchand, V., **Ravuri, A.** and Lawrence, N. D. (2022). *Generalised GPLVMs with SVI, AISTATS 2022*, accessible here.

5. **Ravuri, A.** et al. (2022). *Ice Core Dating using Probabilistic Programming*, accessible here (NeurIPS GPs & Spatiotemporal Modelling Workshop 2022).

Employment

Barclays

London, UK

Dec. 2018 - Sep. 2021

- Designed and productionized large-scale statistical models for balance sheet simulation of term deposits and loans, accounting for customer behavior and economic trends. Modeling mainly involved Markovian models, GAMs and time series models.
- In addition to this, assisted with and reviewed other model implementations (e.g. for current accounts, savings and mortgages), piloted new tools, created knowledge-bases, worked on automation and performed exploratory work to identify areas of efficiency (e.g. with Spark, Rcpp, Docker), reducing execution times from days to seconds in some cases.

Sciemus

London, UK

Data Scientist + Statistician

Sep. 2017 - Dec. 2018

- Was involved with building and maintaining end-to-end stats/tech related solutions, particularly in the space, weather and power business areas. This involved data cleaning, analysis, modeling, documentation, web-app development and deployment (using Shiny, Dash, Flask), basic linux server and database maintenance (using postgres), research and development of infrastructure (e.g. aiding development of a distributed computing cluster on AWS).
- On the modeling side, I've worked with GLMs for assessing risk probabilities, Hidden Markov models & sparse Gaussian Processes to model rates based on large-scale weather data, importance sampling & subset simulation to accelerate simulations and other ideas in Bayesian statistics.