Seth Nabarro

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I am a PhD student in probabilistic machine learning at Imperial College London, supervised by Dr. Mark van der Wilk and Prof. Andrew Davison. My topics of interest include Bayesian machine learning; local, distributed and hardware-aware learning; generative modelling; message passing.

Education

Imperial College London
Jan 2021-present

PhD Student in Probabilistic Machine Learning

Projects:

- Data augmentation in Bayesian neural nets and the cold posterior effect (UAI, 2022)
- Local deep learning with belief propagation in Gaussian factor graphs (under review)
- Joint learning and state estimation in Gaussian factor graphs (in progress)

Teaching:

- Probabilistic inference (2021-2022), graduate teaching assistant
- Robotics (2021-2022, 2022-2023), graduate teaching assistant

University College London
2015-2016

Computational Statistics and Machine Learning MSc. Average: 82%
Dean's List for outstanding academic performance

Applied Machine Learning, Bioinformatics, Cluster and Spatial Statistics, Statistical Computing, Statistical Modelling, Statistical Natural Language Processing, Supervised Learning and Unsupervised Learning (Gatsby).

Dissertation (81%): Spatiotemporal prediction of ambulance demand using Gaussian process regression.

Imperial College London
2010-2014

Physics MSci. First Class Hons. Average: 78%.

Modules including: Biophysics of Nerve Cells, Statistics of Measurement, Core Mathematics, Dynamical Systems and Chaos, Quantum Mechanics, Quantum Information and General Relativity, computational and experimental labs.

Dissertation (74%): Built FPGA system and C# program to record and plot photon counts in real time. Used as diagnostic tool in atomic physics experiment.

Professional Experience

Graphcore
Dec 2018 - Dec 2020

Research Engineer

Research into hardware-aware probabilistic machine learning.

- Read and digested recent papers in field
- Implemented and experimented with algorithms in `TensorFlow`
- Compared performance across different hardware acceleration platforms
- Wrote blog post on accelerating hybrid MCMC and variational inference model
- Worked on publications 3 and 4

InformedActions
Sep 2016 - Nov 2018

Machine Learning Engineer

Applying ML to social housing, facilities management, energy and healthcare problems.

- Implementing ML algorithms in python, deploying/serving them for use by clients
- Acted as industrial supervisor for three UCL CSML MSc dissertations
- Wrote paper summarising dissertation research (see publication 5)

TSBF Consultancy
July 2017 - Nov 2018

Machine Learning Researcher (part time)

Developing, evaluating and writing reports on AI solutions to business problems.

- Commercial credit rating classification
- Copper price prediction
- Fine wine price prediction

ADEC Innovations
Sep 2014 - Sep 2015

Supply Chain Analyst
- Designed web applications and their respective data models
- Analysed data collected in the applications and presented results to clients

Seoul National University
Summer 2013

Research Intern - Single Molecule Biophysics Group
- Used experimental physics techniques to shed light on genetic mechanism
- Prepared biological samples and conducted single molecule experiments
- Conducted Bayesian analysis of recorded data to infer states of DNA molecule

National University of Singapore
Summer 2012

Research Intern - Centre for Environmental Sensing and Modeling
- Investigated interaction between palm trees and CO_2 in an urban environment
- Used growth rates found in literature to model CO_2 uptake
- Included findings in published paper (see publication 6)

Publications

1. **S. Nabarro**, M. van der Wilk and A.J. Davison. Learning in Deep Factor Graphs with Gaussian Belief Propagation, 2023.
   Awarded Best Poster at the Imperial College Computing Summer Conference 2023.
2. **S. Nabarro***, S. Ganev*, A. Garriga-Alonso, V. Fortuin, M. van der Wilk, and L. Aitchison. Data Augmentation in Bayesian Neural Networks and the Cold Posterior Effect, 2022.
   Paper accepted at *UAI* 2022 (poster).
   Paper accepted at *ICCV workshop on Visual Inductive Priors*, 2021 (poster).
3. S. Kulkarni, M.M. Krell, **S. Nabarro**, and C.A. Moritz. Hardware-accelerated Simulation-based Inference of Stochastic Epidemiology Models for COVID-19. *arXiv preprint arXiv:2012.14332*, 2020.
4. M. Laskin, L. Metz, **S. Nabarro**, M. Saroufim, B. Noune, C. Luschi, Jascha Sohl-Dickstein, and P. Abbeel. Parallel Training of Deep Networks with Local Updates. *arXiv preprint arXiv:2012.03837*, 2020.
5. **S. Nabarro**, T. Fletcher, and J. Shawe-Taylor. Spatiotemporal Prediction of Ambulance Demand using Gaussian Process Regression. *arXiv preprint arXiv:1806.10873*, 2018.
6. E. Velasco, M. Roth, S.H. Tan, M. Quak, **S. Nabarro**, and L. Norford. The Role of Vegetation in the CO_2 Flux from a Tropical Urban Neighbourhood., *Atmos. Chem. Phys., 13*, 10185–10202, 2013.

Service

Reviewer *Uncertainty in Artificial Intelligence*, 2023. Awarded Top Reviewer.

Reviewer *Artificial Intelligence and Statistics*, 2024. In progress.

Reviewer *International Conference on Robotics and Automation*, 2024. In progress.

Skills

Languages Matlab (beginner), python (strong), R (intermediate)

Libraries and Frameworks `cython`, `GPy`, `GPFlow`, `numpy`, `pandas`, `PyTorch`, `scikit-learn`, `scipy`, `TensorFlow`, `TensorFlow Probability`

Core Competencies Bash, Git, Latex, Linux, Trello, Unit Testing.

Databases MySQL, NoSQL, PostgreSQL.

Other
- Full, clean UK driving licence.
- French language: beginner.
