Prakhar **Verma**

Doctoral Candidate · Machine Learning Researcher · Aalto University

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Education

Aalto University — *Finland*

Doctor of Philosophy (Ph.D.) — *2022-Present*

- Exploring statistical machine learning with Prof. Arno Solin.
- Broadly researching probabilistic modeling and efficient inference techniques.

Aalto University — *Finland*

Master of Science (M.Sc.) — *2019 - 2021*

- Major in Machine Learning, Data Science, and Artificial Intelligence
- Minor in Mathematics
- 4.7/5 (Pass with Honors)

Uttarakhand Technical University — *India*

Bachelor of Technology (B.Tech.) — *2012 - 2016*

- Specialization in Information Technology
- 79.03% (First Division with Honors)

Professional Experience

Aalto University — *Espoo, Finland*

Doctoral Researcher — *September 2022 - Present*

- Researching probabilistic modeling and efficient inference techniques, particularly variational inference in non-linear SDE models.
- Recently, my work has focused on sequential decision-making models that need computationally efficient and well-calibrated uncertainty.

Research Assistant — *April 2020 - August 2022*

- Member of the AaltoML group; focused on probabilistic machine learning to develop learning methods and efficient approximate inference methods for dynamical systems and stochastic differential equation (SDE) models.

SpectacularAI — *Espoo, Finland*

Research Engineer (Part-time) — *September 2021 - September 2022*

- Consultant for an electronic firm researching methods to incorporate uncertainty in their deep learning models, making them robust.

TomTom — *Pune, India*

Software Engineer (R&D) — *July 2016 - August 2019*

- Researched and developed a semantic segmentation solution for extracting map features from satellite imagery and automatically ingesting them into the database, removing human-in-the-loop.
- Developed a POC for a real-time map vector tile server, which was later converted into an open platform product.
- Developed an ArcGIS plugin used daily by surveyors across the globe for field surveying and reporting.

Publications

- **Prakhar Verma**, Vincent Adam, Arno Solin. Variational Gaussian Process Diffusion Processes. June 2023 (pre-print)
- Paul Edmund Chang*, **Prakhar Verma***, S.T. John, Arno Solin, and Mohammad Emtiyaz Khan. Memory-based dual Gaussian processes for sequential learning. *International Conference on Machine Learning (ICML), 2023. (Oral Presentation)*
- **Prakhar Verma**, Paul Chang, Arno Solin, Mohammad Emtiyaz Khan. Sequential Learning in GPs with Memory and Bayesian Leverage Score. *Asian Conference in Machine Learning (ACML) workshop "Continual Lifelong Learning" 2022 (Contributed talk).*
- Paul Chang, **Prakhar Verma**, ST John, Victor Picheny, Henry Moss, Arno Solin. Fantasizing with Dual GPs in Bayesian Optimization and Active Learning. *Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems, NeurIPS Workshop, 2022.*
- **Prakhar Verma**, Vincent Adam, Arno Solin. Sparse Gaussian Processes for Stochastic Differential Equations. *The Symbiosis of Deep Learning and Differential Equations (DLDE), NeurIPS Workshop, 2021.*

- Arno Solin, Ella Tamir, **Prakhar Verma**. Scalable Inference in SDEs by Direct Matching of the Fokker–Planck–Kolmogorov Equation. *Advances in Neural Information Processing Systems 35* (NeurIPS), 2021.
- Fuzail Palnak[*], Kshitij Nikhal[*], **Prakhar Verma**[*], Ravi Panchani[*], and Sagar Rohankar[*]. M.A.G.E.C: machine assisted geometry extraction and creation. *Twelfth International Conference on Machine Vision* (ICMV 2019).

Theses

- Verma, P. (2021). Sparse Gaussian processes for stochastic differential equations [Master's thesis]. Aalto University. PDF
- Verma, P. (2016). Development of automated GIS Tools on various platforms [Bachelor's thesis]. Uttarakhand Technical University, TomTom India. PDF

Skills & Interests

- Probabilistic machine learning, Gaussian processes, Bayesian learning, uncertainty quantification, deep learning, optimization
- Python, PyTorch, GPFlow, numPy, scikit-learn, JAX, AWS

Presentations

- Tensorflow case study on how convolution neural networks can be used to extract road networks and airports from satellite imagery and how TFServing can host the models at Google Developers Group 2018.
- An end-to-end machine learning framework to detect and extract essential map features from satellite imagery and ingest them into the database removing human-in-the-loop at GeoSpatial World Forum 2018.

Accomplishments

- Awarded *"Dean Scholarship"* in *2020* and *2021* at Aalto University.
- Awarded *"Face of TomTom 2018"* for actively representing TomTom in conferences and promoting the brand.
- Winner of TomTom *"Innovation Day 2018"*, presented an artificial intelligence plugin which bridges the gap between machines and cartographers.
- Mentor at "TomTom External Hackathon 2018".
- *"Electronic Health Record"* idea was selected in Top 10 at a national event, "India Ideathon 2015".
- Oracle Certified Associate Java SE 7 programmer.