

# Prakhar Verma

DOCTORAL CANDIDATE · MACHINE LEARNING RESEARCHER · AALTO UNIVERSITY

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## Education

### Aalto University

DOCTOR OF PHILOSOPHY (PH.D.)

Finland

2022-Present

- Exploring statistical machine learning with [Prof. Arno Solin](#).
- Broadly researching probabilistic modeling and efficient inference techniques.

### Aalto University

MASTER OF SCIENCE (M.SC.)

Finland

2019 - 2021

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

### Uttarakhand Technical University

BACHELOR OF TECHNOLOGY (B.TECH.)

India

2012 - 2016

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

## Professional Experience

### University of Oxford

VISITING RESEARCHER

Oxford, United Kingdom

July 2023 - Present

- Visiting [Prof. Seth Flaxman](#) researching on encoding prior information and efficient inference techniques tailored towards life sciences and medical applications.

### Aalto University

DOCTORAL RESEARCHER

Espoo, Finland

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

RESEARCH ENGINEER (PART-TIME)

Espoo, Finland

September 2021 - September 2022

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

### TomTom

SOFTWARE ENGINEER (R&D)

Pune, India

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<sup>\*</sup>, Kshitij Nikhal<sup>\*</sup>, **Prakhar Verma<sup>\*</sup>**, Ravi Panchani<sup>\*</sup>, and Sagar Rohankar<sup>\*</sup>. M.A.G.E.C: machine assisted geometry extraction and creation. *Twelfth International Conference on Machine Vision (ICMV 2019)*.

## Theses

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- 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

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

## Presentations

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- 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

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- 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.