Justin Bunker

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Professional Summary

Machine learning researcher completing PhD at University of Cambridge with a publication in Journal of Machine Learning Research. Expertise in generative models, statistical learning, and deep learning developed through research on diffusion models and functional autoencoders. Previous experience developing proprietary trading software at DRW and quantitative analysis tools at Société Générale. Strong foundation in both advanced machine learning theory and practical software engineering in financial environments.

Education

University of Cambridge   **Cambridge, UK**
PhD in Machine Learning   *2020–2026*
- **Splunk Scholar** – Fully funded by Splunk Inc.
- Thesis submission: January 2026
- Published "Autoencoders in Function Space" in Journal of Machine Learning Research (JMLR)
- Developed novel diffusion models for high-dimensional synthetic image generation
- Applied generative models and deep learning methods to improve segmentation with limited labeled data
- Research areas: Generative models (diffusion, VAEs), statistical learning, functional data analysis
- Collaborated with domain experts in remote sensing and presented research at international conferences

University of Cambridge   **Cambridge, UK**
MPhil in Machine Learning and Machine Intelligence   *2018–2019*
- Thesis: *Extending and Applying the Gaussian Process Autoregressive Regression Model*
- Covered: Linear models, neural networks, graphical models, statistical inference
- Group project: Deep learning methods for continual learning

Concordia University   **Montreal, QC**
Independent Student (Part-time)   *2017–2018*
- Mathematics and Statistics courses
- GPA: 4.30/4.30

Concordia University   **Montreal, QC**
Bachelor of Computer Engineering, Great Distinction   *2012–2016*
- **Computer Engineering Medal** recipient
- GPA: 4.04/4.30
- Russell Breen Scholarship recipient
- Developed AI algorithm that won in-class competition

Dawson College   **Montreal, QC**
DEC in Electronics Engineering Technology   *2009–2012*
- Specialization in Computers and Networks
- Graduated with honors

Professional Experience

University of Cambridge   **Cambridge, UK**
Research Assistant   *2019–2020*
- Collaborated with Splunk Inc. on machine learning research for complex data distributions
- Developed mixture modeling techniques and statistical learning methods
- Co-authored paper on advanced mixture modeling methodologies

Vigilant Global – A DRW Company   **Montreal, QC**
Software Developer   *Nov 2016–Sep 2018*
- Developed features for proprietary trading software in high-frequency trading environment
- Designed and implemented full-stack training system for candidate evaluation in simulated trading scenarios
- Refactored legacy codebases to improve performance and integrate modern frameworks
- Applied quantitative and analytical skills to build tools supporting systematic trading strategies

Société Générale   **Montreal, QC**
Software Developer (Co-op)   *Jan 2015–Aug 2015*

- Implemented features in C# for collateral monitoring application in trading operations
- Migrated financial reports to SSRS framework, managing full development lifecycle
- Presented technical solutions to business stakeholders in investment banking division

Ericsson   **Montreal, QC**
Software Developer (Co-op)   *Aug 2013–Dec 2013*

- Developed Python automation scripts for OSS network benchmarking
- Reduced data extraction time from 8 hours to 2 hours through process optimization (75% improvement)

Publications

2024: **Bunker, J.** & Lambley, H. "Autoencoders in Function Space." *Journal of Machine Learning Research (JMLR)*, accepted.

2023: **Bunker, J.** et al. "Pothole Detection Using Machine Learning." EWGT2023 (European Working Group on Transportation).

2022: **Bunker, J.**, Curtis, K., Girolami, M., & Sriharsha, R. "A mixture modeling approach for clustering log files with coreset and user feedback." *Pattern Recognition Letters*, 156, 74–80.

Selected Theses

2026: **Bunker, J.** "[PhD Thesis Title]." PhD Thesis, University of Cambridge. (Forthcoming)

2019: **Bunker, J.** "Extending and Applying the Gaussian Process Autoregressive Regression Model." MPhil Thesis, University of Cambridge.

Technical Skills

Programming: Python, C/C++, SQL

ML Frameworks: PyTorch, TensorFlow, JAX, scikit-learn, Keras

Specialized Skills: Generative models (diffusion, VAEs, normalizing flows), statistical learning, deep learning, optimization, data analysis

Tools & Systems: Git, Linux, Docker, LaTeX, Jupyter, HPC clusters

Awards & Scholarships

2020–2024: **Splunk Scholar** – Full PhD funding from Splunk Inc.

2016: **Computer Engineering Medal** – Top graduating student, Concordia University

2012–2016: **Russell Breen Scholarship** – Academic excellence, Concordia University

Selected Presentations

2025: *"Synthetic SAR Imagery Generation Using Diffusion Models for Ice Floe Monitoring"* – EGU25 Conference, Vienna, Austria

2024: *"Autoencoders in Function Space"* – Invited Talk, Physics X, London, UK

2022–2024: *"Introduction to Machine Learning for Civil Engineering Researchers"* – Annual seminar, University of Cambridge

Teaching Experience

University of Cambridge   **Cambridge, UK**
Supervisor   *2022–2024*

- Supervised small-group teaching sessions for **3M1: Mathematical Methods**
- Part IIA Engineering Tripos (3 years: 2022, 2023, 2024)
- Topics: Linear algebra, stochastic processes, optimization methods

MEng Project Supervision...

2024: **Shuohan Tao** – "Enhancing the Normalizing Flow on the Function Space"

2024: **Prithvi Raj** – "Thermodynamic Integration"

2021: **Jay Wong** – "Design of Experiments for Bayesian Partition Models"

Languages

English: Native speaker

French: Native speaker   *Fully bilingual*