

# Lewis Smith

<https://lsgos.onl>

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## Summary

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Machine learning researcher. 5+ years of experience of leading and taking part in novel research in machine learning and related fields, both theoretical and applied, with a publication record at leading venues and experience with training and deploying models in industry. Key areas of experience include modern large scale language modelling, probabilistic and Bayesian methods, and applications in quantitative finance, physical sciences and Earth observation. Core technical skills include strong mathematical and scientific background, especially in statistics, linear algebra, optimisation and physics, and numerical programming in Python, especially using JAX, PyTorch and Pyro, as well as numpy, scikit-learn, pandas etc. Some experience with C++ and MATLAB. Experience with GPU and TPU platforms, including deploying code on a 4096 chip TPU pod for language model training at scale. Proven ability to deliver both under loose supervision and in small, tightly collaborative teams, as well as experience in project management overseeing masters students, and in teaching at the university of Oxford. Experience conducting research both in an open, academic environment and in commercially sensitive settings.

## Education

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**University of Oxford** *DPhil in Computer Science* **2017-2022**  
Autonomous Intelligent Machines and Systems CDT  
Supervisor: Yarin Gal  
Thesis Title: *Structure & Uncertainty in Deep Learning*

**University of Manchester** *MPhys (Hons) in Physics (1st Class)* **2013-2017**  
Masters project: *Discovering Pulsars and Transients with Intelligent Algorithms*

## Professional Experience

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**Cohere** *Member of Technical Staff* **September 2022 - Present**

- » Technical staff member on core modelling team, working on researching and improving the Large Language Models provided by Cohere's API.
- » Maintained and improved the internal training codebase, including writing an inference server to facilitate model evaluation and implementing new techniques and architectures.
- » Executed several high-impact modelling projects, including managing training of a 300B parameter language model and increasing the context length of Cohere's production models, and implementing advanced finetuning techniques.

**Cohere** *Machine Learning Intern* **April 2022-July 2022**

- » Worked on a research project exploring alternative architectures to the standard transformer at scale

**G-Research** *Quantitative Research Intern* **Summer 2021**

- » Worked with real exchange data to model and empirically test models of electronic auction market dynamics

**Frontier Development Lab Europe** *Researcher* **Summer 2019**

- » Developed an algorithm for performing on-board flood segmentation in an 8 week sprint with a small team, targeted at a satellite due to be launched by the European Space Agency

**University of Oxford** *Teaching Assistant* **Various Classes, 2017-22**

**Cambridge Consultants** *Intern Mathematician* **Summer 2016**

- » Applied transfer learning to the vision system in a robotic arm for an internal research project, developing and testing a prototype of this algorithm on hardware

## Publications

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### **Uncertainty Quantification for Virtual Diagnostic of Particle Accelerators**

*Physical Review: Accelerators & Beams*, 2021

Owen Convery, **Lewis Smith**, Yarin Gal, Adi Hanuka

### **Towards Global Flood Mapping onboard Low Cost Orbital Satellites with Machine Learning**

*Nature Scientific Reports*, 2021

Gonzalo Mateo-Garcia, Josh Veitch-Michaelis, **Lewis Smith**, Silviu Oprea et. al

### **Liberty or Depth: Deep Bayesian Neural Nets do not need Complex Weight Posterior Approximations**

*Neural Information Processing Systems*, 2020

Sebastian Farquhar, **Lewis Smith**, Yarin Gal

### **Capsule Networks: A Generative Probabilistic Perspective**

*International Conference on Machine Learning OOL Workshop*, 2020

**Lewis Smith**, Lisa Schut, Yarin Gal, Mark van der Wilk

### **Uncertainty Estimation Using a Single Deep Deterministic Neural Network**

*International Conference on Machine Learning*, 2020

Joost van Amersfoort, **Lewis Smith**, Yee Whye Teh, Yarin Gal

### **Galaxy Zoo: Probabilistic Morphology through Bayesian CNNs**

*Monthly Notices of the Royal Astronomical Society*, 2019

Mike Walmsley, **Lewis Smith**, Chris Lintott, Yarin Gal et. al.

### **Understanding Measures of Uncertainty for Adversarial Example Detection**

*UAI*, 2018

**Lewis Smith**, Yarin Gal