Adam Foster

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EXPERIENCE

2017 – PRESENT | UNIVERSITY OF OXFORD, UNIVERSITY COLLEGE

DPhil Statistical Machine Learning

I am a third year DPhil student in the Oxford Computational Statistics and Machine Learning group, under the supervision of Yee Whye Teh and Tom Rainforth. A large part of my work in Oxford has been on optimal experimental design: how do we design experiments that will be most informative about the process being investigated? I also study contrastive representation learning through the lenses of mutual information and invariance.

SUMMER 2020 | BENEVOLENTAI

AI Science intern

I investigated deep representation learning methods for single-cell RNA sequence data in genomics.

SUMMER 2018 | UBER AI LABS

Research intern

I interned with the Pyro team under the supervision of Noah Goodman. My contributions to Pyro were part of a project to automate optimal experimental design for adaptive experimentation in science.

2016 – 2017 | ROAM ANALYTICS

Machine learning engineer

Through the Silicon Valley Internship Program, I spent a year in San Francisco working for a startup as a machine learning engineer. I helped build a knowledge graph of medical and pharmaceutical concepts and data. I went on to use MinHash as a way to search large data in sublinear time, and investigate causal inference using observational data as a way to improve patient outcomes.

2012 – 2016 | UNIVERSITY OF CAMBRIDGE, QUEENS' COLLEGE

MMath Mathematics

Grade Distinction | Rank 6th

Awards 2016 Wishart Prize; 2014–16 Foundation Scholarship; 2015 Colton Prize; 2013 Braithwaite Prize

In Part III, "the oldest and most famous mathematics examination in the world", I chose to focus on statistics and probability. My essay was entitled 'New advances in causal inference'.

PUBLICATIONS

PREPRINTS

A Foster, DR Ivanova, I Malik, T Rainforth. Deep Adaptive Design: Amortizing Sequential Bayesian Experimental Design. **arXiv:2103.02438.**

T Goda, T Hironaka, W Kitade, A Foster. Unbiased MLMC stochastic gradient-based optimization of Bayesian experimental designs. **arXiv:2005.08414.**

MAIN CONFERENCE PAPERS

A Foster, R Pukdee, T Rainforth. Improving Transformation Invariance in Contrastive Representation Learning. **ICLR.** 2021.

A Foster, M Jankowiak, M O'Meara, YW Teh, T Rainforth. A Unified Stochastic Gradient Approach to Designing Bayesian-Optimal Experiments. **AISTATS.** 2020.

A Foster, M Jankowiak, E Bingham, P Horsfall, YW Teh, T Rainforth and ND Goodman. Variational Bayesian Optimal Experiment Design. **NeurIPS (spotlight).** 2019.

B Bloem-Reddy, A Foster, E Mathieu, and YW Teh. Sampling and inference for beta neutral-to-the-left models of sparse networks. **UAI.** 2018.

CODE

I'm on Github (`ae-foster`). My open source contributions include optimal experimental design support in **Pyro** , of which I am the main author, a PyTorch implementation of **SimCLR** and our own contrastive learning method **InvCLR** , and Redis support for **Datasketch** .