HUGO FRY

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Education

Jesus College, University of Cambridge
October 2022 – July 2023

MSci in Physics — *Cambridge, UK*

First class, with an average mark of 77%. Research project focused on Explainable AI. My courses included Quantum Field Theory, Statistical Field Theory, Biological Physics and Graph Neural Networks.

Jesus College, University of Cambridge
October 2019 – July 2022

BA in Mathematics — *Cambridge, UK*

First class, with an average mark of 75%. I ranked 30/241 in second year. Specialized in theoretical physics.

Queen Elizabeth's Grammar School
2012 – 2019

A Levels: 4 A*s (Maths, Further Maths, Computer Science and Physics) – 2019 — *Alford, UK*
GCSEs: 10 A*s and 2 As – 2017

Research and Experience

AI Safety Hub
July 2023 – October 2023

Research Intern — *Oxford, UK*

- I was the lead author on a paper submitted to NeurIPS 2023.
  * The paper was produced as part of a team working on investigating Contrast Consistent Search (CCS) - an unsupervised method for discovering latent knowledge of Large Language Models.
  * I clarify the behaviour of CCS, and illustrate empirically what CCS is optimizing for through a new proxy loss function.
  * I demonstrate that for a certain hyper-parameter value the new loss function leads to a prober with very similar weights to CCS.
  * I further show that for a different hyper-parameter value, the new loss function outperforms the state of the art (CCS) across a number of datasets and models.
- I was an author on a second paper submitted to NeruIPS 2023, which analyses the adversarial robustness of CCS compared to a 0-shot baseline.

Centre for AI Safety
July 2023 – August 2023

Introduction to ML Safety Course — *Remote*

- This was a nine-week part-time course taught by Dan Hendrycks. The course covered a large range of topics in ML Safety including Adversarial Robustness, Monitoring/Evaluations, Systemic Safety and Alignment.

Computer Laboratory, University of Cambridge
October 2022 – July 2023

Student Researcher (MSci) — *Cambridge, UK*

- My research focused on Explainable AI for Graph Neural Networks (GNNs) using Information Theory.
- I analysed the training dynamics of a GNN in the information plane. I demonstrate that there is no phase transition or representation compression in GNNs, in line with recent work.
- I use the mutual information calculations to devise a novel explainability tool for GNNs in order to understand which parts of the input data the network uses to classify a node.
- I was supervised by Professor Pietro Lió from the Computer Laboratory, Cambridge.

Seung Labs, Princeton University
July 2022 – October 2022

Computational Neuroscience Research Intern — *Remote*

- I calculated the segregation index across neuron type and location, to better understand the density of recurrent connections in different brain regions.
- I investigated applying self-supervised contrastive learning to more accurately perform axon-dendrite splitting of the neurons.
- I worked with a petabyte-scale electron microscopy volume of the drosophila brain.
- The research was in the field of drosophila connectomics, working with Professor Sebastian Seung.

Extra Curricular Achievements and Awards

Jesus College Scholar (2021, 2023): Awarded for exceptional exam results.

International Theoretical Physics Olympiad (2021): Placed 16th of 256 teams from around the world. My team was representing the University of Cambridge.

British Physics Olympiad (2019): Placed top 11 in the country with over 3000 applicants. After two rounds of exams, I was asked to attend a week-long training camp held at Oxford University in order to select the British team for the International Physics Olympiad.

Lincoln Mathematics Challenge (2018): Overall national competition winner.

Leadership

RAF Officer Cadet: I was an officer cadet for two years at the Cambridge University Air Squadron (CUAS). CUAS is a reservist unit of the RAF affiliated with the university and offers flying, leadership and adventure training. As part of this role, I took the responsibility of the Station Visits Project Officer.

Bike Touring: Organised and led several bike touring trips in small groups. This includes a weeklong tour across Scotland and England at the age of 16, a two-week tour across France and Switzerland at the age of 18, a solo trip from Zurich to Paris, and most recently a trip across the Massif Central from Montpellier to Paris.

Deputy Head Boy: A year-long leadership position, which I was awarded at school in 2018. I gained valuable skills in organisation and public speaking.

World Challenge: A month-long student led trip to Nepal in 2018. We each organised and led the group for two days. During the trip, we helped rebuild a school in rural Nepal and hiked to Annapurna Base Camp.