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Matthew Sargent

PhD Candidate

mjsargent.github.io
github.com/mjsargent
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Education

Doctor of Philosophy, *Department of Computer Science, University College London* **2019—present**
Exchange Student, *Department of Biological Engineering, Massachusetts Institute of Technology* **Summer 2018**
Master of Engineering (First Class Honours), *Biomedical Engineering, Imperial College London* **2015—2019**

Skills

Languages and Tools	Python (Expert), Git, LaTeX, C++ (Basic), JavaScript (Basic), MATLAB (Proficient), Unity, HPC (Slurm, SGE)
Machine Learning	JAX, PyTorch, Reinforcement Learning, Representation Learning, Graph ML, Sequence Modelling
Other Technologies	OpenEphys, Electronic Instrumentation, QMK Firmware, Ultimaker CURA, OpenSCAD

Technical Experience

Postgraduate Teaching Assistant **2019 — present**
University College London *London, UK*

- Responsible for aiding the delivery of the Machine Vision, Reinforcement Learning and Neural Computation MSc/MEng courses
- Delivered Machine Vision tutorials to groups of around eighty Master students
- Ran student presentations for the Neural Computation course and gave feedback on students' understanding and delivery

Tutorial Designer, Admissions Assistant and Teaching Assistant **2020—2021**
Neuromatch Academy *Global*

- Participated in the organisation of the first and second iterations of the Neuromatch Academy Deep Learning and Computational Neuroscience summer schools, attended by over four thousand students
- Designed Jupyter notebooks to act as tutorials for the Intro to PyTorch and Deep Reinforcement Learning sessions
- Reviewed student and teaching assistant applications
- Delivered tutorials over three weeks to a small group of 7 students as a teaching assistant

Third Year Research Project **2018**
Imperial College London *London, UK*

- Collaborated with experimental researchers at Imperial College London to identify a failure mode in animal surgeries
- Worked directly with end-users to ascertain the necessary features of the device and GUI
- Designed an automated solution for monitoring animal breathing rate non-invasively
- Created a minimal-cost Arduino-based device and wrote a low-latency continuous monitoring algorithm in C
- Awarded best project prize, and presented at a national biomedical engineering conference

Research Experience

PhD Candidate **2019 — present**
University College London, Centre for Artificial Intelligence *London, UK*

- Currently researching the use of abstraction and generalisation in deep reinforcement learning
- Conducting a project involving the development of novel algorithms using elements of graph theory, computational neuroscience, and state-of-the-art architectures including transformers
- Developed internal frameworks for distributed reinforcement learning with cluster computing
- Awarded a four year EPSRC Studentship covering stipend and fees
- Led interdisciplinary collaboration between colleagues in Computer Science and Neuroscience
- Regularly presented research in internal seminars and to the UCL NeuroAI Interest group
- Presented work at two international conferences (RLDM, NeurIPS)

Masters Thesis Project **2018 — 2019**
Imperial College London, Biologically Inspired Computation and Inference Group *London, UK*

- Researched biologically inspired artificial neural networks incorporating sparsity and Hopfield-like pattern completion
- Developed a novel architecture for use in a one-shot meta learning paradigm
- Demonstrated the increased efficacy of this architecture under noisy conditions compared to baseline approaches

Undergraduate Research Assistant **Summer 2018**
Imperial College London, Biologically Inspired Computation and Inference Group *London, UK*

- Coded a pipeline for processing and attempting to solve abstract reasoning tasks using deep learning
- Learnt the basics of neural network modelling and advanced machine learning paradigms such as meta learning

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International Research Exchange Student **Summer 2018**
Massachusetts Institute of Technology, Jasanoff Lab *Cambridge, MA*

- One of two students in the Department of Bioengineering chosen to participate in an international research exchange
- Collected and analysed data from simultaneous fMRI and *in-vivo* electrode recordings
- Trained in basic animal handling and surgery, and the use of fMRI machines and electrophysiological recording

Undergraduate Research Assistant **Summer 2017**
Imperial College London, Boutelle Group *London, UK*

- Contributed to research on using dexamethasone perfusion for improving the resolution of microdialysis probes used in monitoring traumatic brain injuries
- Produced microdialysis probes and constructed an automated microfluidic test rig
- Assisted in data collection for wireless monitoring of glucose in kidneys

Additional Experience

STEM Outreach Leader **2019 — present**
Imperial College London *London, UK*

- Responsible for designing and delivering day-long workshops to potential STEM applicants
- As a Senior Residential Assistant working on Sutton Trust summer schools, assumed pastoral responsibility for around a hundred sixth formers and managed a team of 10 undergraduates
- Acted as Duty Supervisor for the Imperial Reach Out Lab — responsible for the logistics for any workshops ran in the lab

Unit Manager and Advanced First Aider **2017 — 2019**
St John Ambulance *London, UK*

- Led the organisation of a volunteer first aider unit of $\sim$ fifty active volunteers
- Managed the recruitment and development of all volunteer first aiders based at Imperial College London
- Coordinated the Unit Management team and advised on delegated matters such as the volunteer first aid training programme and social engagement
- Represented the unit at the regional level and assisted in establishing wider student volunteering strategy
- Organised first aid provision for large events run by Imperial College London including the annual summer ball

Publications

Augustine N. Mavor-Parker, **Matthew J. Sargent**, Andrea Banino, Lewis Griffin, and Caswell Barry. "A Simple Approach for State-Action Abstraction using a Learned MDP Homomorphism". *In Submission*, 2023.

Matthew J. Sargent, Peter J. Bentley, Caswell Barry, and William de Cohti. "Temporally Extended Successor Representations". *The 5th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM)*, 2022.

Matthew J. Sargent, Augustine N. Mavor-Parker, Peter J. Bentley, and Caswell Barry. "Representing Repeated Structure in Reinforcement Learning Using Symmetric Motifs". *Workshop on Symmetry and Geometry in Neural Representations, NeurIPS*, 2022.

Matthew J. Sargent, George Meek, Peter Miller, Joshua Pope, and Paul Roever. "Monitoring of Breathing Rate in Anesthetised Mice by Piezoelectric-Transduction-based Pressure Sensing". *BioMedEng19*, 2019, p. 152. github.com/proever/Breath-Rate-Monitor.

Awards

EPSRC Doctoral Studentship, 4-year award for stipend, fees and consumables **2019**
EPSRC Vacation Research Bursary, awarded for summer research in artificial intelligence **2018**
Imperial International Research Opportunities Programme Award, awarded to two Bioengineering students to facilitate an international research exchange **2018**
Dept. of Bioengineering Best Group Research Project, awarded to the best undergraduate research project **2018**
Wellcome Trust Vacation Scholarship, awarded for research in neuroscience **2017**