Aniruddh Raghu

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http://aniruddhraghu.com/

Education

Massachusetts Institute of Technology — Massachusetts, USA

Ph.D. candidate in **Computer Science**; **GPA:** 5.0 — Sept. 2018 – present

Co-advised by Prof. John Guttag and Prof. Collin Stultz

Research at the intersection of machine learning and healthcare.

Graduate courses: Computer Networking, Computer Vision, Computational Systems Biology

Trinity College, Cambridge University — Cambridge, UK

BA (First Class), MEng (Distinction) in **Information and Computer Engineering** — Oct. 2014 – June 2018

Masters Thesis: Reinforcement Learning for Clinical Decision Support

Key Courses: Computer Vision, Deep Learning & Structured Data, Probabilistic Machine Learning, Linear Algebra, Probability, Practical Optimisation, Software Engineering & Design

Massachusetts Institute of Technology — Massachusetts, USA

Third Year Exchange Programme; **GPA:** 5.0 — Sept. 2016 – May 2017

Courses: Algorithms, Inference, Applied Probability, Machine Learning for Healthcare, Biomedical Signal & Image Processing, Computer Systems Engineering, Global Business of AI and Robotics, New Enterprises

Awards

Kennedy Scholarship — 2018

Awarded to outstanding British students undertaking graduate study at MIT/Harvard.

Trinity College Senior Scholarship — 2017

For outstanding academic performance in second/third year undergraduate exams.

Trinity College Junior Scholarship — 2016

For outstanding academic performance in first year undergraduate exams.

International Physics Olympiad — 2014

Bronze medal for UK team. Selected as one of five students to represent the country.

Publications

Representation Balancing MDPs for Off-Policy Policy Evaluation

Y. Liu, O. Gottesman, **A. Raghu**, M. Komorowski, A. Faisal, F. Doshi-Velez, E. Brunskill — 2018

Neural Information Processing Systems 2018; spotlight at CausalML workshop at International Conference on Machine Learning (ICML) 2018.

Continuous State-Space Models for Optimal Sepsis Treatment: a Deep Reinforcement Learning Approach

A. Raghu, M. Komorowski, L. Celi, P. Szolovits, M. Ghassemi — 2017

Machine Learning for Healthcare 2017; Neural Information Processing Systems (NIPS) 2017 workshop on Machine Learning for Health (extensions).

Preprints and Workshop Papers

Model-Based Reinforcement Learning for Sepsis Treatment

A. Raghu, M. Komorowski, S. Singh — 2018

Spotlight at Machine Learning for Health workshop at Neural Information Processing Systems (NeurIPS) 2018.

Behaviour Policy Estimation for Off-Policy Policy Evaluation: Calibration Matters
A. Raghu, O. Gottesman, Y. Liu, M. Komorowski, A. Faisal, F. Doshi-Velez, E. Brunskill 2018
Spotlight at CausalML workshop at International Conference on Machine Learning (ICML) 2018.

Research Experience

Computer Vision and Wireless Sensing Sept. 2018 – June 2019
Research project developing deep learning-based computer vision algorithms for human shape recovery and activity recognition from wireless sensing data. In submission.

Off-Policy Reinforcement Learning for Medical Treatment Jan. 2017 – June 2018
Research project using reinforcement learning techniques to discover high-quality medical treatment policies for patients in intensive care with sepsis. Also investigated how to evaluate these learned policies robustly. Code available at https://github.com/aniruddhraghu/sepsisrl.
Collaboration with Prof. Marzyeh Ghassemi (UToronto), Prof. Peter Szolovits (MIT), Prof. Finale Doshi-Velez (Harvard), Prof. Emma Brunskill (Stanford).

Industrial Experience

Intern Project: Computer Vision for Ground Automation Cambridge, UK
Amazon Prime Air: Software Development Internship July – Sept. 2017
Created a computer vision system to aid ground automation. Developed a custom dataset and used deep learning techniques (fine-grained convolutional neural networks, adversarial training) to obtain an effective system.
Patent application in progress.

Intern Project: Emulation Systems & Data Analytics Cambridge, UK
ARM: Software Development Internship June – July 2016
Extended the Fast Models software product to support new platforms and advanced features for a future software release. This software product emulates the ARM architecture on x86 machines to expedite application development.
Created a text data mining and semantic analysis tool for ARM Research.
Developed a data analytics platform for GPUs, using workflow data to inform architectural developments.

Intern Project: Software Development for Low-Power Radio Networks Cambridge, UK
Cambridge Consultants: Software Development Internship July – Aug. 2016
Full stack development of embedded, Linux, and server side systems to create a scalable IoT platform. Worked with public/private key cryptography and protocols such as 802.15.4g, 6LoWPAN/lwIP and CoAP.

Peer Review

Machine Learning for Healthcare 2018, 2019
Neural Information Processing Systems: Machine Learning for Health workshop 2017, 2018

Independent Projects

SpatialRL Cambridge, UK
HackCambridge Jan. 2017
Developed a system that used the Unity game engine to create custom game environments to train reinforcement learning agents. Won a prize at Hack Cambridge Recurse, as a team of four, for the best use of SpatialOS, a distributed simulation

environment.

Vectorised Educational Video Compression California, USA
Facebook Global Hackathon Finals Oct.– Dec. 2016
Worked with an MIT startup, *dotLearn*, to develop a system that achieves over hundred-fold compression ratios on videos to improve education access in developing countries. Won third place at the Facebook Global Hackathon Finals, as part of a team of four. Demo: https://ylgh.github.io/

Technical Skills

Areas: Machine Learning, Reinforcement Learning, Computer Vision, Software Development

Languages: Python, C/C++, MATLAB

Libraries: NumPy, OpenCV, TensorFlow, MXNet, PyTorch

Misc.: Git, Linux

Music

Indian Classical Violin
Classically trained for over 14 years. Have given numerous solo and group performances in venues across the UK.

Western Classical Flute
Classically trained for 10 years.

Acoustic Guitar
Self-taught for over 7 years. Interested in solo acoustic fingerstyle compositions.