

Aniruddh Raghu

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Education

Massachusetts Institute of Technology

Ph.D. candidate in **Computer Science**; **GPA**: 5.0

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

Thesis topic: Improving the sample-efficiency of machine learning methods through strategies such as meta-learning, nested optimization, and pre-training, focusing on applications in healthcare.

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

Massachusetts, USA

Sept. 2018 – present

Trinity College, Cambridge University

BA (First Class), MEng (Distinction) in **Information and Computer Engineering**

Masters Thesis: Reinforcement Learning for Clinical Decision Support

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

Cambridge, UK

Oct. 2014 – June 2018

Awards

Kennedy Scholarship

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

2018

Trinity College Junior & Senior Scholarships

For outstanding academic performance in undergraduate exams.

2016, 2017

International Physics Olympiad: Bronze Medal

Selected as one of five students to represent the UK at the competition in Astana, Kazakhstan.

2014

Publications

Data Augmentation for Electrocardiograms

A. Raghu, D. Shanmugam, E. Pomerantsev, J. Guttag, C. Stultz

Conference on Health, Inference, and Learning (CHIL) 2022.

2022

A deep learning model for inferring elevated pulmonary capillary wedge pressures from the 12-lead electrocardiogram

D. Schlesinger, N. Diamant, **A. Raghu**, E. Reinertsen, K. Young, P. Batra, E. Pomerantsev, C. Stultz

Journal of the American College on Cardiology: Advances, March 2022.

2022

Meta-Learning to Improve Pre-training

A. Raghu, J. Lorraine, S. Kornblith, M. McDermott, D. Duvenaud

Neural Information Processing Systems (NeurIPS) 2021.

2021

Teaching with Commentaries

A. Raghu, M. Raghu, S. Kornblith, D. Duvenaud, G. Hinton

International Conference on Learning Representations (ICLR) 2021.

2021

Learning to Predict with Supporting Evidence: Applications to Clinical Risk Prediction

A. Raghu, J. Guttag, K. Young, E. Pomerantsev, A. V. Dalca, C. M. Stultz

ACM Conference on Health, Inference, and Learning (CHIL) 2021.

2021

Assessment of medication self-administration using artificial intelligence

M. Zhao, K. Hoti, H. Wang, **A. Raghu**, D. Katabi

Nature Medicine.

2021

Rapid Learning or Feature Reuse? Towards Understanding the Effectiveness of MAML

A. Raghu*, M. Raghu*, S. Bengio, O. Vinyals

International Conference on Learning Representations (ICLR) 2020.

2020

Through-Wall Human Mesh Recovery Using Radio Signals
M. Zhao, Y. Liu, **A. Raghu**, T. Li, H. Zhao, A. Torralba, D. Katabi 2019
International Conference on Computer Vision (ICCV) 2019.

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 (NeurIPS) 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; NeurIPS 2017 workshop on Machine Learning for Health (extensions).

Preprints and Workshop Papers

ECG-guided Non-invasive Estimation of Pulmonary Congestion in Patients with Heart Failure
A. Raghu, D. Schlesinger, E. Pomerantsev, P. Shah, J. Guttag, C. Stultz 2022
In preparation for submission to Lancet, Digital Health.

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.

Industrial Experience

ML Research Internship: Multimodal Medical Image-Text Models Cambridge, MA, USA
Google Health AI Team June – Aug. 2021
Research project on designing multimodal deep learning models for medical imaging that explain outputs using clinically meaningful natural language. Contributed to shared JAX codebase used by Health AI team. Publication in progress.

ML Research Internship: Learning to Teach with Commentaries Toronto, Canada
Google Brain Team May – Aug. 2020
Research project on learning *commentaries*: meta-information that can be used to speed up neural network training, improve generalisation, and provide insights. Paper based on this work published at ICLR 2021.

Software Engineering Internship: Computer Vision for Surface Flaw Detection Cambridge, UK
Amazon Prime Air July – Sept. 2017
Created a computer vision pipeline to automatically detect surface flaws in delivery drones. [Patent here](#).

Peer Review

International Conference on Learning Representations (ICLR)
International Conference on Machine Learning (ICML)
Neural Information Processing Systems (NeurIPS)
Conference on Health, Inference, and Learning (CHIL)
Machine Learning for Healthcare (MLHC)

Technical Skills

Areas: Machine learning, Deep learning, Computer vision, Software development

Languages: Python, C/C++

Libraries and Tools: NumPy, Pandas, PyTorch, TensorFlow, JAX, OpenCV, Git, Linux