David Yunis

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Education

Toyota Technological Institute at Chicago — Chicago, IL, USA
MS in Computer Science, PhD in Computer Science — October 2019-October 2025 (Expected)
Advisor: Matthew Walter

GPA: 3.85/4.00

Relevant Coursework: Introduction to Machine Learning, Convex Optimization, Speech Technologies, Unsupervised Learning and Data Analysis, Information and Coding Theory

University of Chicago — Chicago, IL, USA
BS in Mathematics and Molecular Engineering — Class of 2019

GPA: 3.81/4.00

Relevant Coursework: Analysis in $\mathbb{R}^n$ (accelerated), Basic Algebra (honors), Introduction to Engineering Analysis, Self-driving Vehicles: Models and Algorithms for Autonomy (Duckietown), Fundamentals of Deep Learning, Algorithms, Multivariate Statistical Analysis, Introduction to the Theory of Machine Learning

Experience

Research Assistant — Chicago, IL, USA
Toyota Technological Institute at Chicago (TTIC) — October 2019-Present

- Currently leading a project on improving retrieval-augmented language models under David McAllester (PyTorch, FAISS, Transformers, Deepspeed, Gradio)
- Currently leading a project on adapting BPE-tokenized action spaces to offline reinforcement learning under Matthew Walter (PyTorch, Tokenizers, Gym, MuJoCo)
- Led a project on a faster (100x) method to extract skills that make sparse-reward reinforcement learning possible in challenging domains under Matthew Walter (PyTorch, Stable Baselines, Gym, MuJoCo)
- Worked with small team to implement primitives in order to run Code-as-Policies on a physical UR5 robot arm, developed a small web-app to demo the work at Museum of Science and Industry in Chicago, IL to thousands of visitors on a weekend in April 2023 under Matthew Walter (ROS, UR5, OpenCV, Flask, JavaScript)
- Co-led a project on extracting segmentation from existing vision models without training or labels under Michael Maire (PyTorch, Matplotlib).
- Led a project on understanding optimization in deep learning from an empirical lens, requiring training, mixing and logging thousands of neural networks in a cluster environment (PyTorch, Plotly)
- Worked on self-supervised pre-training for speech with RNNs in the pre-wav2vec 2.0 era (PyTorch, FairSeq, Transformers)

Deep Learning Perception Intern, Autonomous Vehicles — Chicago, IL, USA (Remote)
NVIDIA Corporation — January - April 2022

- Led work to tackle real-world issues with automotive perception stack, resulting in a 20x speedup on prior solutions

Robotic Intelligence through Perception Lab (RIPL) — Chicago, IL, USA
Toyota Technological Institute at Chicago (TTIC) — August 2016-March 2019

- Worked on a joint optimization project for simulated legged robots using deep reinforcement learning

– Ran multiple demos of Duckietown, both in the lab for visiting elementary school students, and for the general public at National Robotics Week 2018 (April 14-15) at the Museum of Science and Industry, Chicago, IL

Mathematics REU (Full Program) Chicago, IL, USA
University of Chicago June 2017-August 2017

– Studied Ergodic Theory for two months under a graduate student mentor and wrote an expository paper on the Birkhoff Ergodic Theorem with applications to continued fractions (available at http://math.uchicago.edu/~may/REU2017/REUPapers/Yunis.pdf)

Articles

T. Yoneda, J. Fang, P. Li, H. Zhang, T. Jiang, S. Lin, B. Picker, **D. Yunis**, H. Mei, and M. Walter. "Statler: State-Maintaining Language Models for Embodied Reasoning" *In Submission*, June 2023.

D. Yunis, J. Jung, Z. Dai, and M. Walter. "Subwords-as-Skills: Tokenization for Sparse Reward Reinforcement Learning" *In Submission*, September 2023.

X. Zhang*, **D. Yunis***, and M. Maire. "Spectral Clustering of Layer-Distributed Neural Representations," *In Submission*, April 2023.

D. Yunis, K. K. Patel, P. H. P. Savarese, G. Vardi, J. Frankle, M. Walter, K. Livescu, M. Maire. "On Convexity and Linear Mode Connectivity in Neural Networks" in *OPT 2022*, December 2022.

C. Schaff, **D. Yunis**, A. Chakrabarti, and M. Walter, "Jointly Learning to Construct and Control Agents using Deep Reinforcement Learning," in *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, May 2019.

C. Schaff, **D. Yunis**, A. Chakrabarti, and M. Walter, "Jointly Optimizing Placement and Inference for Beacon-Based Localization," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, Canada, September 2017.

Teaching

TA for TTIC 31230 Unsupervised Learning and Data Analysis under Karen Livescu Spring 2023

TA for TTIC 31220 Fundamentals of Deep Learning under David McAllester Autumn 2022

Service

Reviewer for NeurIPS 2023, TMLR, ICML 2023, T-RO, ICLR 2024

Awards

National Science Foundation (NSF) Graduate Research Fellowship 2019-2024

Software

Python (PyTorch, NumPy, SciPy, Jupyter Notebooks, Matplotlib, Flask, Plotly, Transformers, Weights & Biases, ROS, MuJoCo, Lightning, Deepspeed), Bash, Vim, Slurm, C++ (beginner), JavaScript (beginner), HTML + CSS (beginner)

Personal

Photography