ANNA E. BAIR

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EDUCATION

Carnegie Mellon University

PhD student in the Machine Learning Department — September 2020 - present
Advisor: Zico Kolter
Research interests: Model compression (pruning, distillation), OOD robustness, LLMs, sharpness, interpretability.

Massachusetts Institute of Technology (MIT)

Master of Engineering in Computer Science — September 2019
Thesis: Molecular Graph Self Attention and Graph Convolution for Drug Discovery

Bachelor of Science in Computer Science and Engineering — June 2018
Minor in Brain and Cognitive Sciences

RESEARCH

Bosch AI Research, Dr. Devin Willmott — May - August 2023
Research Intern — *Pittsburgh, PA*

Collaboration is still ongoing. Leading a research project investigating optimal model distillation strategies between foundation models and small IoT-sized models.

Nvidia AV Perception Research, Dr. Jose Alvarez — May 2022 - January 2023
Research Intern — *Remote*

Led a research project investigating the deleterious effects of pruning on natural robustness in computer vision tasks for convolutional neural networks. We developed a new optimization method that allows models to be pruned while retaining more of their robust performance. This work is currently under submission.

Universitat Pompeu Fabra Complex Systems Lab, Prof. Ricard Sole — September 2019 - June 2020
Fulbright Predoctoral Researcher — *Barcelona, Spain*

Developed theory and wrote simulations for projects analyzing parabolic replicator dynamics and distributed biological intelligence. Chosen to deliver a research presentation on complex systems at the Fulbright Spain Mid-Year Seminar.

MIT CSAIL Clinical Decision Making Group, Prof. Peter Szolovits — May 2017 - September 2019
SuperUROP and Master's Research — *Cambridge, MA*

Used graph convolutional networks with self-attention and position embeddings to perform molecule property prediction. Used machine learning methods to model gene expression data and analyze co-regulated genes. Work resulted in poster presentations at the Women in Machine Learning (WiML) and Women in Data Science (WiDS) workshops.

MIT Interactive Robotics Group, Prof. Julie Shah — September 2015 - April 2016
UROP — *Cambridge, MA*

Conducted experiments that assessed situational awareness in human-robot interaction. Performed statistical analysis of experimental results. Work resulted in a publication in The International Journal of Robotics Research (IJRR).

PUBLICATIONS AND PREPRINTS

- **Bair, A.**, Yin, H., Shen, M., Molchanov, P., Alvarez, J. (2023). Adaptive Sharpness-Aware Pruning for Robust Sparse Networks. https://arxiv.org/pdf/2306.14306.pdf
- Feng, Z., **Bair, A.**, Kolter, Z. (2023). Leveraging Multiple Descriptive Features for Robust Few-shot Image Learning. https://arxiv.org/pdf/2307.04317.pdf
- Sun, M., Liu, Z., **Bair, A.**, Kolter, Z. (2023) A Simple and Effective Pruning Approach for Large Language Models. *Under review.* https://arxiv.org/pdf/2306.11695.pdf
- Rice, L., **Bair, A.**, Zhang, H., & Kolter, J. Z. (2021). Robustness between the worst and average case. *NeurIPS 2021.* https://proceedings.neurips.cc/paper/2021/file/ea4c796cccfc3899b5f9ae2874237c20-Paper.pdf
- Gombolay, M., **Bair, A.**, Huang, C., & Shah, J. (2017). Computational design of mixed-initiative human-robot teaming that considers human factors: situational awareness, workload, and workflow preferences. *The International Journal of Robotics Research, 36*(57), 597 – 617. https://doi.org/10.1177/0278364916688255

PRESENTATIONS

- **Bair, A.**, McDermott, M., Wang, J., Zhao, W., Sheridan, S., Szolovits, P., Kohane, I., Haggarty, S., & Perlis, R. (2018, December 3). *Improved modeling and analysis of gene expression.* Poster presented at Women in Machine Learning (WiML) Workshop, co-located with NeurIPS 2018, Montréal, Canada.
- **Bair, A.**, McDermott, M., Wang, J., Zhao, W., Sheridan, S., Szolovits, P., Kohane, I., Haggarty, S., Perlis, R. (2019, March 4). U*sing Machine Learning to Improve Drug Development.* Poster presented at Women in Data Science (WiDS) Cambridge Conference, Cambridge, MA.

INDUSTRY

Microsoft June 2018 - August 2018
Software Engineering Intern *Redmond, WA*

Migrated data quality metrics from SQL to NoSQL database. Improved and refactored existing codebase using C#, U-SQL, and T-SQL.

Driver June - August 2017
Software Engineering Intern *San Francisco, CA*

Built an API using Python, PostgreSQL, and Flask for a consumer technology company building a platform to give cancer patients access to new treatments. API stores patient information and integrates with internal services to automate ordering of medical diagnostic test kits from a third party vendor.

TEACHING

CMU Teaching Assistant September 2023 - present
Advanced Introduction to Machine Learning (10-715) *Pittsburgh, PA*

Develop and grade homework assignments and exams, lead a recitation, and hold office hours.

Lumiere Mentor July 2023 - present
Varied *Remote*

Mentor individual high school students through a 12 week program to develop an independent research project and produce a research paper on a machine learning-related topic of their choice.

MIT Women's Technology Program (WTP) Instructor June - July 2019
Math for Electrical Engineering and Computer Science *Cambridge, MA*

Taught at a program for rising high school senior girls to gain exposure to computer science and engineering. Worked with three MIT student teaching assistants to prepare and deliver lectures on introductory math for computer science topics, including binary numbers, algorithms, linear algebra, and graph theory.

MIT Teaching Assistant September 2018 - June 2019
Introduction to Computer Science and Programming (6.00) *Cambridge, MA*

Taught weekly recitation sections, wrote problem sets, and held office hours.

MIT Lab Assistant January - June 2018
Introduction to Computer Science and Programming (6.00) *Cambridge, MA*

Assisted students with problem sets, gave check-offs, and debugged problem sets before release.

La Miranda School Instructor January 2018
Varied *Barcelona, Spain*

Developed lesson plans and taught math, coding, physics, biology, and English to students in grades 6 through 12.

MIT Lab Assistant September - December 2017
Computation Structures (6.004) *Cambridge, MA*

Assisted students with labs, gave check-offs, helped students with quiz preparation.

AWARDS

- Fulbright Predoctoral Research Grantee, Barcelona, Spain, 2019-2020

SKILLS

Programming: Python, Java, C#, SQL, MATLAB, JavaScript, HTML/CSS
Languages: Spanish (Proficient)