Tyler LaBonte

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Research Interests

Mathematical Foundations of Machine Learning
Generalization Theory of Deep Learning
Implicit Regularization of Optimization Methods
Robustness, Fairness, and Scaling of Large Models

Education

GEORGIA INSTITUTE OF TECHNOLOGY   2021–Present
Ph.D., Machine Learning
Minor in Mathematics
Advisors: Vidya Muthukumar and Jacob Abernethy

UNIVERSITY OF SOUTHERN CALIFORNIA   2017–2021
B.S., Applied and Computational Mathematics, *magna cum laude*
Minor in Computer Science
Advisor: Shaddin Dughmi

Publications

CONFERENCE ARTICLES

1. The Group Robustness is in the Details: Revisiting Finetuning under Spurious Correlations
   Tyler LaBonte, John C. Hill, Xinchen Zhang, Vidya Muthukumar, and Abhishek Kumar
   NeurIPS 2024

2. Towards Last-layer Retraining for Group Robustness with Fewer Annotations
   Tyler LaBonte, Vidya Muthukumar, and Abhishek Kumar
   NeurIPS 2023

3. Scaling Novel Object Detection with Weakly Supervised Detection Transformers
   Tyler LaBonte, Yale Song, Xin Wang, Vibhav Vineet, and Neel Joshi
   WACV 2023

JOURNAL ARTICLES

1. Student Misconceptions of Dynamic Programming: A Replication Study
   Michael Shindler, Natalia Pinpin, Mia Markovic, Frederick Reiber, Jee Hoon Kim, Giles Pierre
   Nunez Carlos, Mine Dogucu, Mark Hong, Michael Luu, Brian Anderson, Aaron Cote, Matthew
   Ferland, Palak Jain, Tyler LaBonte, Leena Mathur, Ryan Moreno, and Ryan Sakuma.
   Computer Science Education, 32(3):288–312, 2022

2. Quantifying the Unknown Impact of Segmentation Uncertainty on Image-Based Simulations
Michael C. Krygier, Tyler LaBonte, Carianne Martinez, Chance Norris, Krish Sharma, Lincoln N. Collins, Partha P. Mukherjee, and Scott A. Roberts
Nature Communications, 12(1):5414, 2021

Workshop Articles

1. Saving a Split for Last-layer Retraining can Improve Group Robustness without Group Annotations
Tyler LaBonte, Vidya Muthukumar, and Abhishek Kumar
ICML 2023 Workshop on Spurious Correlations, Invariance, and Stability

2. Dropout Disagreement: A Recipe for Group Robustness with Fewer Annotations
Tyler LaBonte, Vidya Muthukumar, and Abhishek Kumar
NeurIPS 2022 Workshop on Distribution Shifts

3. Scaling Novel Object Detection with Weakly Supervised Detection Transformers
Tyler LaBonte, Yale Song, Xin Wang, Vibhav Vineet, and Neel Joshi
CVPR 2022 Workshop on Transformers in Vision

Theses

1. Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization
Tyler LaBonte
Undergraduate Thesis, University of Southern California, 2021
Winner of the USC Discovery Scholar distinction

Manuscripts

1. We Know Where We Don't Know: 3D Bayesian CNNs for Credible Geometric Uncertainty
Tyler LaBonte, Carianne Martinez, and Scott A. Roberts
Manuscript, 2019

Awards

2nd Place Research Talk/Poster Presentation – DoD NDSEG Conference	2023
Simons Institute Deep Learning Theory Workshop Travel Grant ($2,000)	2022
DoD National Defense Science and Engineering Graduate Fellowship ($170,000)	2021
– One of two undergraduates to receive both DoD NDSEG and NSF GRFP in Computer Science	
NSF Graduate Research Fellowship ($138,000—declined)	2021
USC Discovery Scholar (Research distinction for <100 USC graduates)	2021
USC Viterbi & USC Dornsife Dean's List	2017–2021
Neo Scholar (Top ~100 CS undergraduates in America) – Neo	2020
U.S.S. Bowfin Memorial Scholarship ($5,000)	2020
1st Place Computer Vision Project – TreeHacks, Stanford University	2019
1st Place Healthcare AI Project – TreeHacks, Stanford University	2019
1st Place Data Analytics Project – HackSC, USC	2019

Admiral Bernard Clarey Memorial Scholarship ($7,000)	2018
National Top 20 Ethical Hacking Finalist – MAJOR LEAGUE HACKING	2018
USC Trustee Scholar ($250,000)	2017
USC Viterbi Fellow ($24,000)	2017
Dolphin Scholarship ($13,600)	2017
Rear Admiral Paul Lacy Memorial Scholarship ($6,500)	2017
National Merit Scholar ($3,000)	2017

Industry Research Experience

GOOGLE   Sunnyvale, CA
Machine Learning Research Intern   2023
Advisor: Kun Lin
Developed techniques to leverage Gemini LLM to improve hardware-software code design.

MICROSOFT RESEARCH   Redmond, WA
Machine Learning Research Intern   2021–2022
Advisor: Neel Joshi
Developed Transformer model for weakly supervised object detection with multiple instance learning.

GOOGLE X   Mountain View, CA
Machine Learning Research Intern   2020
Advisor: Daniel R. Silva
Developed novel deep learning architecture for temporal identity preservation in object tracking.

SANDIA NATIONAL LABORATORIES   Albuquerque, NM
Machine Learning Research Intern   2019–2020
Advisors: Carianne Martinez and Scott A. Roberts
Developed Bayesian deep learning model for geometric uncertainty in engineering applications.

Talks

1. Georgia Tech School of Industrial & Systems Engineering – ATLANTA, GA   2024
   Task Shift: Classification to Regression via Benign Overfitting

2. Georgia Tech Machine Learning Center – ATLANTA, GA   2024
   Task Shift: Classification to Regression via Benign Overfitting

3. Google DeepMind – MOUNTAIN VIEW, CA   2023
   Towards Last-layer Retraining for Group Robustness with Fewer Annotations

4. Google Cloud Technical Infrastructure – SUNNYVALE, CA   2023
   Large Language Models for Hardware-Software Code Design

5. DoD NDSEG Conference – San Antonio, TX   2023
   Towards Last-layer Retraining for Group Robustness with Fewer Annotations

6. Microsoft Research – Redmond, WA   2021
   Weakly Supervised Detection Transformers for Effortless Computer Vision

7. USC Computer Science Theory Group – Los Angeles, CA   2021
   The Distance Oracle for Convex Optimization

8. Google X – Mountain View, CA   2020
   Temporal Identity Preservation in Multiple Object Tracking

9. USC Computer Science Theory Group – Los Angeles, CA   2019
   3D Bayesian CNNs for Credible Geometric Uncertainty

10. USC Center for Artificial Intelligence in Society – Los Angeles, CA   2019
    3D Bayesian CNNs for Credible Geometric Uncertainty

11. USC Center for Artificial Intelligence in Society – Los Angeles, CA   2019
    Machine Learning Fairness in Word Embeddings

Advising

1. Xinchen Zhang – Georgia Tech MS   2024–

2. John C. Hill – Georgia Tech BS/MS → Georgia Tech PhD   2022–2024

3. Pratik Deolasi – Georgia Tech BS → MathWorks   2021–2022

4. Rishit Mohan Ahuja – Georgia Tech BS → Georgia Tech MS   2021–2022

Teaching

1. Lecturer/Teaching Assistant (8 lectures) | Georgia Institute of Technology   2024
   CS 7545: Machine Learning Theory

2. Lecturer/Teaching Assistant (12 lectures) | Georgia Institute of Technology   2023
   CS 7545: Machine Learning Theory

3. Undergraduate Teaching Assistant | University of Southern California   2021
   CSCI 270: Introduction to Algorithms and Theory of Computing

4. Instructor | USC Center for Artificial Intelligence in Society   2019
   Introduction to Machine Learning

5. Undergraduate Teaching Assistant | University of Southern California   2018
   CSCI 170: Discrete Methods in Computer Science

Reviewing

1. Reviewer, NeurIPS 2024

2. Reviewer, ICLR 2024

3. Reviewer, NeurIPS 2023

Service and Leadership

1. Student Organizer, Learning Theory Alliance Workshop   2023

2. System Administrator, Georgia Tech ML Theory GPU Cluster   2022–

3. Organizer, Georgia Tech ML Theory Reading Group   2021–2023

4. Projects Lead | USC Center for Artificial Intelligence in Society   2019

5. Associate Director of Robotics Outreach | USC Viterbi K-12 STEM Center   2018

6. Robotics Mentor | USC Viterbi K-12 STEM Center   2017–2018

Open Source Software

1. Last-layer Retraining: Robustness to spurious correlations without group annotations   2023
   https://github.com/tmlabonte/last-layer-retraining   ★ 9

2. Milkshake: Quick and extendable experimentation with classification models   2023
   https://github.com/tmlabonte/milkshake   ★ 4   ⑂ 2

3. WS-DETR: Weakly supervised Transformers for scaling novel object detection   2021–2022
   https://github.com/tmlabonte/weakly-supervised-detr   ★ 10   ⑂ 6

4. BCNN: 3D Bayesian CNNs for credible geometric uncertainty   2019–2020
   https://github.com/sandialabs/bcnn   ★ 59   ⑂ 19
   Transitioned to a production environment by Sandia National Laboratories
   19$^{\text{th}}$ most starred Sandia repository out of 608 (June 2024)

5. Tendies: Decoupling deep learning development and deployment   2018
   https://github.com/tmlabonte/tendies   ★ 36   ⑂ 11
   Transitioned to a production environment by the Air Force Research Laboratory

Other Activities

1. Fleet Captain, Georgia Tech Sailing Club   2023–

2. House Chair, USC Hawai'i Club   2020–2021

3. Vice President of Finance, USC Hawai'i Club   2019–2020