Tyler LaBonte

Ph.D. Student & NDSEG Fellow
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Research Interests

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

Education

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

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

2. 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 internal 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. DoD NDSEG Conference - SAN ANTONIO, TX — 2023
   Towards Last-layer Retraining for Group Robustness with Fewer Annotations
2. Microsoft Research ML Area Intern Symposium – REDMOND, WA — 2021
   Weakly Supervised Detection Transformers for Effortless Computer Vision
3. USC Computer Science Theory Group – LOS ANGELES, CA — 2021
   The Distance Oracle for Convex Optimization
4. Mineral Tech Talks at Google X – MOUNTAIN VIEW, CA — 2020
   Temporal Identity Preservation in Multiple Object Tracking
5. USC Computer Science Theory Group – LOS ANGELES, CA — 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
6. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA — 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty

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

Advising

1. John C. Hill – Georgia Tech MS 2022–
2. Pratik Deolasi – Georgia Tech BS → MathWorks 2021–2022
3. Rishit Mohan Ahuja – Georgia Tech BS → Georgia Tech MS 2021–2022

Teaching

1. Lecturer and Teaching Assistant | Georgia Institute of Technology 2023
   CS 7545: Machine Learning Theory
2. Undergraduate Teaching Assistant | University of Southern California 2021
   CSCI 270: Introduction to Algorithms and Theory of Computing
3. Curriculum Lead | USC Center for Artificial Intelligence in Society 2019
   Introduction to Machine Learning
4. Undergraduate Teaching Assistant | University of Southern California 2018
   CSCI 170: Discrete Methods in Computer Science

Reviewing

1. Reviewer, ICLR 2024
2. Reviewer, NeurIPS 2023

Service and Leadership

1. System Administrator, Georgia Tech ML Theory GPU Cluster 2022–
2. Organizer, Georgia Tech ML Theory Reading Group 2021–2023
3. Projects Lead | USC Center for Artificial Intelligence in Society 2019
4. Associate Director of Robotics Outreach | USC Viterbi K-12 STEM Center 2018
5. Robotics Mentor | USC Viterbi K-12 STEM Center 2017–2018

Open Source Software

1. Milkshake: Quick and extendable experimentation with classification models 2023
   https://github.com/tmlabonte/milkshake ★ 3 ⑂ 1

2. WS-DETR: Weakly supervised Transformers for scaling novel object detection 2021–2022
   https://github.com/tmlabonte/weakly-supervised-detr ★ 8 ⑂ 3

3. BCNN: 3D Bayesian CNNs for credible geometric uncertainty 2019–2020
   https://github.com/sandialabs/bcnn ★ 56 ⑂ 19
   Transitioned to a production environment by Sandia National Laboratories
   16th most starred Sandia repository (out of 336)
4. Tendies: Decoupling deep learning development and deployment 2018
   https://github.com/tmlabonte/tendies ★ 37 ⑂ 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