Tyler LaBonte

Graduate Researcher
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Research Interests

Mathematical Foundations of Machine Learning
Generalization Theory of Deep Learning
Convex and Non-Convex Optimization
Robustness and Scalability of Deep Learning

Education

GEORGIA INSTITUTE OF TECHNOLOGY — 2021–Present
Ph.D., Machine Learning

UNIVERSITY OF SOUTHERN CALIFORNIA — 2017–2021
B.S., Applied and Computational Mathematics, *magna cum laude* — GPA: 3.73/4.0
Minor in Computer Science — Ph.D. courses: 4

Research Experience

MICROSOFT RESEARCH — Redmond, WA
Machine Learning Research Intern — 2021
Advisors: Yale Song and Neel Joshi

UNIVERSITY OF SOUTHERN CALIFORNIA — Los Angeles, CA
Convex Optimization Undergraduate Researcher — 2020–2021
Advisor: Prof. Shaddin Dughmi
Developed an efficient algorithm to solve the convex feasibility problem with a distance oracle.

GOOGLE X — Mountain View, CA
Machine Learning Research Intern — 2020
Advisor: Daniel R. Silva
Invented 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
Invented novel Bayesian deep learning architecture for credible geometric uncertainty.

UNIVERSITY OF SOUTHERN CALIFORNIA — Los Angeles, CA
Machine Learning Undergraduate Researcher — 2019
Advisor: Prof. Jason D. Lee
Investigated generalization and linearization of overparameterized deep neural networks.

UNIVERSITY OF SOUTHERN CALIFORNIA — Los Angeles, CA
Mechanism Design Undergraduate Researcher — 2018
Advisor: Prof. David Kempe
Investigated distortion bounds in limited-communication metric voting.

AIR FORCE RESEARCH LABORATORY — Kihei, HI
Machine Learning Research Intern — 2018
Advisor: Capt. Justin Fletcher, USAF
Developed framework for decoupling deep learning development and deployment on classified servers.

Publications

PREPRINTS

1. **T. LaBonte**. Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization. Senior Thesis, 2021.
2. M. C. Krygier, **T. LaBonte**, C. Martinez, C. Norris, K. Sharma, L. N. Collins, P. P. Mukherjee, and S. A. Roberts. Quantifying the Unknown: Impact of Segmentation Uncertainty on Image-Based Simulations. Under submission to Nature Communications, 2020. https://arxiv.org/abs/2012.09913.
3. **T. LaBonte**, C. Martinez, and S. A. Roberts. We Know Where We Don't Know: 3D Bayesian CNNs for Credible Geometric Uncertainty. Preprint, 2020. https://arxiv.org/abs/1910.10793.

ACKNOWLEDGMENTS

1. A. Mistry, A. A. Franco, S. J. Cooper, S. A. Roberts, and V. Viswanathan. How Machine Learning Will Revolutionize Electrochemical Sciences. *ACS Energy Letters*, 2021. https://pubs.acs.org/doi/pdf/10.1021/acsenergylett.1c00194.
2. D. Kempe. Communication, Distortion, and Randomness in Metric Voting. In *Proceedings of AAAI 2020*. https://arxiv.org/abs/1911.08129.

Awards

DoD National Defense Science and Engineering Graduate Fellowship ($150,000) — 2021

NSF Graduate Research Fellowship ($138,000, one of 5 undergrads in ML, declined) — 2021

USC Discovery Scholar (Research distinction for <100 USC graduates) — 2021

USC Viterbi & USC Dornsife Dean's List (7-time awardee) — 2017–2020

Neo Scholar (Top ~100 CS undergrads in America) – NEO — 2020

U.S.S. Bowfin Memorial Scholarship ($5,000) — 2020

SIMLR Award for Outstanding Intern – SANDIA NATIONAL LABORATORIES 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 (Full scholarship worth $250,000) 2017

USC Viterbi Fellow (Research funding worth $24,000) 2017

Dolphin Scholarship ($13,600) 2017

Rear Admiral Paul Lacy Memorial Scholarship ($6,500) 2017

National Merit Scholar ($3,000) 2017

Open Source Software

1. BCNN: 3D Bayesian CNNs for credible geometric uncertainty 2019–2020
   `https://github.com/sandialabs/bcnn` ★ 35 ⑂ 10
   Transitioned to a production environment by Sandia National Laboratories
   6th most starred Sandia repository (out of 104)
2. Tendies: Decoupling deep learning development and deployment 2018
   `https://github.com/tmlabonte/tendies` ★ 34 ⑂ 10
   Transitioned to a production environment by the Air Force Research Laboratory

Talks and Presentations

1. USC Theory Group – LOS ANGELES, CA 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
2. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
3. Sandia National Laboratories Summer Research Symposium – ALBUQUERQUE, NM 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty
4. USC Center for Artificial Intelligence in Society – LOS ANGELES, CA 2019
   Machine Learning Fairness in Word Embeddings

Teaching

1. Undergraduate Teaching Assistant | University of Southern California 2021
   CSCI 270: Introduction to Algorithms and Theory of Computing
2. Curriculum Lead | USC Center for Artificial Intelligence in Society 2019
   Introduction to Machine Learning

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

Service and Leadership

1. House Chair and Vice President of Finance | USC Hawaii Club 2018–2021
2. Projects Lead | USC Center for Artificial Intelligence in Society 2019
3. Associate Director of Robotics Outreach | USC Viterbi K-12 STEM Outreach 2018
4. Volunteer VEX Robotics Mentor | USC Viterbi K-12 STEM Outreach 2017–2018