Tyler LaBonte

Undergraduate Researcher
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Research Interests

Mathematical Foundations of Machine Learning
Generalization Theory of Deep Learning
Convex and Non-Convex Optimization
Online Learning and Bandit Problems

Education

University of Southern California 2017–2021
Bachelor of Science, Applied and Computational Mathematics GPA: 3.73/4.0
Minor in Computer Science w/o PhD courses: 3.84/4.0

PhD courses (taken as an undergraduate):

CSCI 670: Advanced Analysis of Algorithms
CSCI 671: Randomized Algorithms
CSCI 672: Approximation Algorithms
CSCI 675: Convex and Combinatorial Optimization

Research Experience

University of Southern California Los Angeles, CA
Convex Optimization Undergraduate Researcher 2020–
Advisor: Prof. Shaddin Dughmi
Investigated lower bounds on oracle information needed to efficiently solve linear programs.

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 methodology for decoupling deep learning development and deployment.

Publications

PREPRINTS

1. **T. LaBonte** and D. R. Silva. Object Evolution: A Generalization of Multiple Object Tracking for Biological Domains. In preparation for ICCV 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. 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. Under submission to WACV 2021. 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. Under submission to ACS Energy Letters.
2. D. Kempe. Communication, Distortion, and Randomness in Metric Voting. In *Proceedings of AAAI 2020*. https://arxiv.org/abs/1911.08129.

Awards

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

USC Viterbi & USC Dornsife Dean's List (6-time awardee) — 2017–2020

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

Open Source Software

1. BCNN: 3D Bayesian CNNs for credible geometric uncertainty — 2019–2020
   `https://github.com/sandialabs/bcnn` ★ 35 ⑂ 9
   Transitioned to a production environment by Sandia National Laboratories
   6th most starred Sandia repository (out of 73)
2. Tendies: Decoupling deep learning development and deployment — 2018
   `https://github.com/tmlabonte/tendies` ★ 34 ⑂ 9
   Transitioned to a production environment by the Air Force Research Laboratory

Invited Talks

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

Teaching

1. Curriculum Lead | USC Center for Artificial Intelligence in Society — 2019
   Introduction to Machine Learning
2. 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 — 2018–2020
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