Tyler LaBonte

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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
Advisor: Prof. Tuo Zhao

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
Thesis: Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization
Advisor: Prof. Shaddin Dughmi

Publications

PREPRINTS

1. 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.

2. **T. LaBonte**, C. Martinez, and S. A. Roberts. We Know Where We Don't Know: 3D Bayesian CNNs for Credible Geometric Uncertainty. Preprint, 2019. https://arxiv.org/abs/1910.10793.

THESES

1. **T. LaBonte**. Finding the Needle in a High-Dimensional Haystack: Oracle Methods for Convex Optimization. Senior Thesis, 2021. Winner of the USC Discovery Scholar distinction. https://tyler-labonte.com/thesis.pdf.

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*, 6:1422–1431, 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 ($170,000)	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	2017–2021
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

Research Experience

MICROSOFT RESEARCH   Redmond, WA
Machine Learning Research Intern   2021
Advisor: 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.

Talks and Presentations

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

2. Mineral Tech Talks at Google X – Mountain View, CA 2020
   Temporal Identity Preservation in Multiple Object Tracking

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

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

5. Sandia National Laboratories Summer Research Symposium – Albuquerque, NM 2019
   3D Bayesian CNNs for Credible Geometric Uncertainty

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

Open Source Software

1. BCNN: 3D Bayesian CNNs for credible geometric uncertainty 2019–2020
   https://github.com/sandialabs/bcnn ★ 35   ⵖ 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 ★ 35   ⵖ 10
   Transitioned to a production environment by the Air Force Research Laboratory

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