
CHI-HENG (HENRY) LIN

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 chihenglin.com

ECE PhD student @ GeorgiaTech

Education

- 09/2017 - 12/2022 (Expected) Ph.D. in Electrical and Computer Engineering. Advisor: Eva L. Dyer
Georgia Institute of Technology, Atlanta, GA
GPA: 4, Selected Courses: Advanced digital signal processing, Machine learning theory, Nonlinear optimization
- 09/2015 - 12/2016 M.A. in Statistics
Columbia University, New York, NY
GPA: 4, Selected Courses: Financial engineering, Game theory, Probability theory, Information theory
- 09/2007 - 06/2013 B.S. & M.S. in Electrical Engineering
National Taiwan University (NTU), Taipei, Taiwan
GPA: 3.8, Selected Courses: Real analysis, Communication theory, Stochastic processes

Skills

Programming Languages / Packages: Python, Pytorch, MATLAB, Wolfram Mathematica, LaTeX, R, SQL, Linux

Technical Expertise: Bayesian optimization, Gaussian processes, Optimal transport, Nonlinear optimization

Languages: Chinese (native), English (full professional proficiency)

Applied Machine Learning Projects

2020 - present **Domain Adaption for Digital Recognition**, Neural Data Science Lab, Georgia Tech

- Developed a low-cost domain adaption method LOT that calibrates model predictions from the source to the target domain and is free of model retraining based on a fast optimal transport algorithm.
- Applied our algorithm to digital recognition data sets USPS, MNIST in balanced and unbalanced cases, and synthetic data set generated by multi-class Gaussian mixture models, with and without data augmentation.
- Analyzed the proposed algorithm's geometric properties, time complexity, transport cost, and sampling complexity and verified the method with extensive empirical simulations on real and synthetic data sets.

2020 - present **Self-Supervised Learning for Image Recognition**, Neural Data Science Lab, Georgia Tech

- Extended the applicability of DeepMind's self-supervised learning algorithm BYOL to scenarios when efficient data augmentation is scarce using novel modules of kNN operator and cascaded projectors.
- Applied to computer vision and neural image data sets CIFAR, ImageNet, multi-neuron recordings from primate brains. The results achieve state-of-the-art performance in classification accuracy.
- Analyzed our algorithm using advanced analysis on the representation learning dynamics.

2018 - 2019 **Hyperparameter Tuning for Large Neural Network Training**, Neural Data Science Lab, Georgia Tech

- Designed the state-of-the-art and cost-efficient hyperparameter tuning algorithm LaMBO for a modular pipelined system using a novel combination of Bayesian optimization and a multi-armed bandit algorithm.
- Applied to neuroimaging reconstruction that automatically tunes the fully convolutional network and various pre-and post-processing hyperparameters in a multi-stage neuroimaging pipeline.
- Our algorithm saves an additional 30% cost compared with other baselines in neuroimaging and synthetic tasks.

Theoretical Machine Learning Projects

- 2021 - present **Understanding the generalizability of Data Augmentations**, Neural Data Science Lab, Georgia Tech
- Characterized the bias and variance trade-off in the linear regression problem with various modern data augmentations.
- 2019 - 2020 **Analysis on Momentum-based Network Training**, Machine Learning Theory Group, Georgia Tech
- Proved acceleration rate for the optimizations of deep linear networks and shallow ReLU networks.

Work Experience

Jan 2015 - Jul 2015 Network Researcher
Academia Sinica, Taipei, Taiwan
Job Description: Development of a multi-view 3D video broadcast protocol.

Publications

Accepted:

- [1] Ran Liu, Mehdi Azabou, Max Dabagia, **Chi-Heng Lin**, Mohammad Gheshlaghi Azar, Keith B Hengen, Michal Valko, Eva L Dyer. Drop, Swap, and Generate a Self-Supervised Approach for Generating Neural Activity. *NeurIPS 2021 Selected for Oral Presentation (<1%)*.
- [2] **Chi-Heng Lin**, Mehdi Azabou, Eva L Dyer. Making Transport More Robust and Interpretable by Moving Data through a Small Number of Anchor Points. *ICML 2021 (21.5%)*.
- [3] **Chi-Heng Lin**, Joseph D Miano, Eva L Dyer. Bayesian Optimization for Modular Black-Box Systems with Switching Costs. *UAI 2021 (26%)*.
- [4] Jun-Kun Wang, **Chi-Heng Lin**, Jacob Abernethy. A Modular Analysis of Provable Acceleration via Polyak's Momentum: Training a Wide ReLU Network and a Deep Linear Network. *ICML 2021 (21.5%)*.
- [5] Jun-Kun Wang, **Chi-Heng Lin**, Jacob Abernethy. Escaping Saddle Points Faster with Stochastic Momentum. *ICLR 2020 (26.5%)*.
- [6] Ebrahim Baktash, **Chi-Heng Lin**, Xiaodong Wang, Mahmood Karimi. Downlink Linear Precoders based on Statistical CSI for Multi-Cell MIMO-OFDM. *Wireless Communications and Mobile Computing*.
- [7] **Chi-Heng Lin**, De-Niang Yang, Ji-Tang Lee, Wanjiun Liao. Efficient Error-Resilient Multicasting for Multi-View 3D Videos in Wireless Networks. *IEEE GLOBECOM 2016 (36.7%)*.
- [8] Fan-Min Tseng and **Chi-Heng Lin** and Kwang-Cheng Chen. In-network Computations of Machine-to-Machine Communications for Wireless Robotics. *Wireless Pers Commun*.

In Submission:

- [9] Mehdi Azabou, Max Dabagia, Ran Liu, **Chi-Heng Lin**, Keith B. Hengen, Eva L. Dyer. Using Self-Supervision and Augmentations to Build Insights into Neural Coding. *NeurIPS 2021 Workshop: Self-Supervised Learning - Theory and Practice*
- [10] Mehdi Azabou, Mohammad Gheshlaghi Azar, Ran Liu, **Chi-Heng Lin**, Erik Johnson, Kiran Bhaskaran-Nair, Max Dabagia, Bernardo Avila Pires, Lindsey Kitchell, Keith Hengen, William Gray Roncal, Michal Valko, Eva Dyer. Mine Your Own view: a Self-Supervised Approach for Learning Representations of Neural Activity. *NeurIPS 2021 Workshop: Self-Supervised Learning - Theory and Practice*

Honors and Awards

Oct 2020 **IDEaS-TRIAD Research Scholarship** - Georgia Tech

Jan, Jun 2016 **Davis Fellowships (two times)** - Department of Statistics in Columbia University

Aug 2017 **Scholarship to Study Abroad** - Taiwan Ministry of Education

Aug 2017 **M&H Bourne Fellowship** - ECE Department in Georgia Tech

Aug 2010 **Presidential Award** - EE Department in National Taiwan University