CHI-HENG (HENRY) LIN

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Education

09/2017 - present

Ph.D. in Electrical and Computer Engineering

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, Advanced calculus, Stochastic processes

Research Projects

Understanding the role of data augmentations in self-supervised learning, Neural Data Science Lab, Georgia Tech

- Analyzed the smoothing effect of data augmentation on the double descent and the occurrence of benign overfitting.
- Characterized the generalization curves of linear regression with augmentation, including crop, adding noise, and mixup.
- Applied augmentations with self-supervised learning methodologies to the neural spike train and 1-d MNIST dataset.

Optimal transport for interpretable data alignment, Neural Data Science Lab, Georgia Tech

- Developed a low-rank distribution alignment method using the concept of unsupervised hierarchical optimal transport.
- Applied to GMM models, domain adaptations of USPS/MNIST, and MNIST/MNIST with drop-out augmentations.
- Derived the geometric properties of the proposed latent Wasserstein discrepancy and provided an optimal cost guarantee.

Theoretical analysis on the neural network training with momentum, Machine Learning Theory Group, Georgia Tech

- Proved Polyak's momentum acceleration on convex functions, deep linear networks, and two-layer ReLU networks.
- Characterized the nonasymptotic convergent rate as functions of condition number with a compact modular analysis.

Bayesian Optimization for Modular Black-box Systems with Switching Costs, Neural Data Science Lab, Georgia Tech

- Designed a cost-efficient hyperparameter tuning algorithm for a modular pipelined system using a novel combination of Bayesian optimization and a slowly moving bandit algorithm, and proved the asymptotic optimality in augmented regret.
- Applied to 3D image reconstruction in a neuroimaging task consisting of a U-Net and multiple data processing stages.

Publications

Under Review:

[1] Mehdi Azabou, Mohammad Gheshlaghi Azar, Ran Liu, **Chi-Heng Lin**, Erik Christopher Johnson, Kiran Bhaskaran Nair, Max Dabagia, Bernardo Avila Pires, Lindsey Kitchell, Keith B Hengen, William Gray-Roncal, Michal Valko, Eva L Dyer. Mine Your Own vieW: self-supervised learning through across-sample prediction. *Submitted to **NeurIPS 2022**.*

[2] 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. *Submitted to **NeurIPS 2022**.*

Accepted:

[1] **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**.

[2] **Chi-Heng Lin**, Joseph D Miano, Eva L Dyer. Bayesian optimization for modular black-box systems with switching costs. ***UAI* 2021**.

[3] 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**.

[4] Jun-Kun Wang, **Chi-Heng Lin**, Jacob Abernethy. Escaping Saddle Points Faster with Stochastic Momentum. ***ICLR* 2020**.

[5] 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***.

[6] **Chi-Heng Lin**, De-Niang Yang, Ji-Tang Lee, Wanjium Liao. Efficient Error-Resilient Multicasting for Multi-View 3D Videos in Wireless Networks. ***IEEE GLOBECOM* 2016**.

[7] 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***.

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

Work experience

Jan 2016 - Jul 2016

Research Assistant

Academia Sinica

Project title: Development of multi-view 3D video broadcast protocol

Accomplishment: Publish "Efficient Error-Resilient Multicasting for Multi-View 3D Videos in Wireless Networks" in *IEEE GLOBECOM* 2016.

Skills

Programming Languages: R, Python, MATLAB, Wolfram Mathematica

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