Chi-Heng **Lin**

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Education

Georgia Institute of Technology *Sep. 2017 - Dec. 2022 (Exp.)*

Ph.D. in Electrical and Computer Engineering, GPA: 4.0/4.0

- Research focus: design and analysis of machine learning algorithms

Columbia University *Sep. 2015 - Dec. 2016*

M.S. in Statistics, GPA 4.1/4.3

- Coursework in convex optimization, information theory, and statistical inferences

National Taiwan University *July. 2007 - Sep. 2013*

B.S. & M.S. in Electrical Engineering, 3.8/4.0

- Coursework in real analysis, stochastic processes, and probability theory

Work Experience

Ambarella Corporation *California, USA*

Algorithm Engineer Intern *Jan. 2022 - Apr. 2022*

- Used TensorFlow and PyTorch to implement various deep learning models for testing the pedestrian crossing predictions and activity classifications
- Benchmarked state-of-the-arts deep learning algorithms on three public pedestrian datasets: PIE, JAAD, and Argoverse
- Implemented the multi-task learning and domain adaption strategies to build up robust deep learning models for generalization in multiple domains
- Performed feature selections on different features, including keypoints, bounding boxes, and images with various processing, to extract essential factors that improve the overall classification performance with minimum computations

Academia Sinica *Taipei, Taiwan*

Network Research Intern *Jan. 2015 - July. 2015*

- Developed multi-view 3D video broadcast protocol for media streams of VR devices
- Performed large-scale simulations of channel times with the NS3 802.11n package
- Conducted the analysis of view loss probability in IEEE 802.11 networks

Skills

Programming Python, Pytorch, TensorFlow, R, MATLAB, Mathematica, LaTex

Technical Machine learning, neuroscience, deep learning, Gaussian process, Optimal transport.

Languages Chinese (native) and English (proficient)

Research Experience

Data augmentation for linear regression and classification *Atlanta, GA*

Neural Data Science Lab (NerDS) / Georgia Institute of Technology *Apr. 2022 - Aug. 2022*

- Established novel framework for generalization analysis of machine learning models that utilize data augmentation
- Developed robust augmentation strategy that has comparable bias as least-squared estimator and variance reduction effect as ridge estimator
- Build up a fast test bed for novel data augmentation invention applicable to regression and classification tasks

Self-Supervised Learning for Neural Data *Atlanta, GA*

Neural Data Science Lab (NerDS) / Georgia Institute of Technology *Feb. 2021 - Dec. 2021*

- Generalized the popular self-supervised learning methods to scenarios when data augmentation is scarce
- Applied to computer vision and neural image data sets: ImageNet, multi-neuron recordings from primate brains
- Established the connection between contrastive learning with optimal transport that generalizes the self-supervised learning

Domain Adaptation for Image Recognition *Atlanta, GA*

Neural Data Science Lab (NerDS) / Georgia Institute of Technology *Jan. 2020 - Jan. 2021*

- Developed a novel domain adaption method with an optimal transport algorithm
- Applied our algorithm to digital recognition data sets USPS and MNIST with data augmentation
- Analyzed the proposed algorithm's geometric properties, time complexity, and sampling complexity

Hyperparameter Tuning for Deep Learning Models *Atlanta, GA*

Neural Data Science Lab (NerDS) / Georgia Institute of Technology *July 2018 - Dec 2019*

- Designed a fast and cost-efficient hyperparameter tuning algorithm based on Bayesian optimization
- Applied to neuroimaging reconstruction that automatically tunes the fully convolutional network
- Achieved an additional 30% cost savings compared with baselines in neuroimaging and synthetic tasks

Machine Learning Publications

- C.-H. Lin, C. Kaushik, E. Dyer, and V. Muthukumar. The good, the bad and the ugly sides of data augmentation: A spectral regularization perspective. In *2022 Conference on the Mathematical Theory of Deep Learning*
- J.-K. Wang, C.-H. Lin, A. Wibisono, and B. Hu. Provable acceleration of heavy ball beyond quadratics for a class of polyak-Łojasiewicz functions when the non-convexity is averaged-out. In *International Conference on Machine Learning (21.9%)*. PMLR, 2022

- R. Liu, M. Azabou, M. Dabagia, C.-H. Lin, M. Gheshlaghi Azar, K. Hengen, M. Valko, and E. Dyer. Drop, swap, and generate: A self-supervised approach for generating neural activity. *Advances in Neural Information Processing Systems (oral <1%)*, 34, 2021
- C.-H. Lin, M. Azabou, and E. Dyer. Making transport more robust and interpretable by moving data through a small number of anchor points. In *International Conference on Machine Learning (21.5%)*, pages 6631–6641. PMLR, 2021a
- J.-K. Wang, C.-H. Lin, and J. D. Abernethy. A modular analysis of provable acceleration via polyak's momentum: Training a wide relu network and a deep linear network. In *International Conference on Machine Learning (21.5%)*, pages 10816–10827. PMLR, 2021
- J.-K. Wang, C.-H. Lin, and J. Abernethy. Escaping saddle points faster with stochastic momentum. In *International Conference on Learning Representations (26.5%)*, 2019
- C.-H. Lin, J. D. Miano, and E. L. Dyer. Bayesian optimization for modular black-box systems with switching costs. In *Uncertainty in Artificial Intelligence (26%)*, pages 1024–1034. PMLR, 2021b
- M. Azabou, M. G. Azar, R. Liu, C.-H. Lin, E. Johnson, K. Bhaskaran-Nair, M. Dabagia, B. Avila Pires, L. Kitchell, K. B. Hengen, W. Gray Roncal, M. Valko, and E. Dyer. Mine your own view: a self-supervised approach for learning representations of neural activity. In *NeurIPS 2021 Workshop: Self-Supervised Learning - Theory and Practice*, 2021a
- M. Azabou, M. Dabagia, R. Liu, C.-H. Lin, K. B. Hengen, and E. Dyer. Using self-supervision and augmentations to build insights into neural coding. In *NeurIPS 2021 Workshop: Self-Supervised Learning - Theory and Practice*, 2021b

Miscellaneous Publications

- C.-H. Lin, D.-N. Yang, J.-T. Lee, and W. Liao. Efficient error-resilient multicasting for multi-view 3d videos in wireless network. In *2016 IEEE Global Communications Conference (GLOBECOM)*, pages 1–7. IEEE, 2016
- E. Baktash, C.-H. Lin, X. Wang, and M. Karimi. Downlink linear precoders based on statistical csi for multicell mimo-ofdm. *Wireless Communications and Mobile Computing*, 2017, 2017
- F.-M. Tseng, C.-H. Lin, and K.-C. Chen. In-network computations of machine-to-machine communications for wireless robotics. *Wireless personal communications*, 70(3):1097–1119, 2013

Honors & Awards

2020	**DEaS-TRIAD Research Scholarship**, Georgia Tech	*U.S.A.*
2016	**Davis Fellowship (two times)**, Columbia University	*U.S.A.*
2017	**M&H Bourne Fellowship**, Georgia Tech	*U.S.A.*
2017	**Studying Abroad Scholarship**, Taiwan Ministry of Education	*Taiwan*
2010	**Presidential Award**, National Taiwan University	*Taiwan*

Services

- Reviewer of Neural Information Processing Systems (NeurIPS) 2022
- Reviewer of International Conference on Machine Learning (ICML) 2022
- Sub-reviewer of Conference on Neural Information Processing Systems (NeurIPS) 2021
- Reviewer of Network Neuroscience, MIT Press Direct