Chung-En Tsai

CS Direct PhD student, ETH Zürich

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Research Interests

Machine learning theory, optimization and control, and related fields.

Education

09.2024 - Present Direct Doctorate Programme in Computer Science (D-INFK).
Eidgenössische Technische Hochschule Zürich (ETH Zürich).

09.2019 - 06.2023 Bachelor of Science in Computer Science and Information Engineering (CSIE).
National Taiwan University (NTU).
GPA: 4.23/4.30, Rank: 5/123.

Experience

10.2024 – Present Research Assistant. *Optimization and Decision Intelligence Group, ETH Zürich*.
- Advisor: Prof. Niao He.

09.2021 – 07.2024 Research Assistant. *Laboratory of Learning Theory and Optimization Methods, NTU*.
- Advisor: Prof. Yen-Huan Li.
- Working on online learning and optimization with logarithmic losses.

09.2022 – 06.2023 Research Assistant. *Mathematics Division, National Center for Theoretical Sciences.*
- Advisor: Prof. Chun-Hsiung Hsia.
- Working on the Kuramoto model.

07.2022 – 08.2022 Summer Research Intern. *Institute of Information Science, Academia Sinica*.
- Advisor: Prof. Kai-Min Chung.
- Studying circuit lower bounds and computational complexity theory.

Teaching

02.2024 – 06.2024 Teaching Assistant of CSIE5410: Optimization Algorithms. *Department of CSIE, NTU*.
Gave an 1.5-hour lecture on "Smooth Stochastic Convex Optimization."

09.2023 – 12.2023 Teaching Assistant of CSIE5062: Online Convex Optimization. *Department of CSIE, NTU*.

02.2023 – 06.2023 Teaching Assistant of CSIE5002: Prediction, Learning, and Games. *Department of CSIE, NTU*.

Service

10.2024 – 12.2024 Reviewer. *The 30th Int. Conf. Learn. Representations (ICLR 2025)*.

07.2024 – 09.2024 Reviewer. *The 38th Annu. Conf. Neural Inf. Process. Syst. (NeurIPS 2024)*.

06.2023 Volunteer. *The 2023 IEEE Int. Symp. Inf. Theory (ISIT 2023)*.

08.2021 – 07.2022 Minister of the Academic Department. *The 44th NTU CSIE Student Council*.

08.2020 – 07.2021 Member of the Academic Department. *The 43th NTU CSIE Student Council*.

Papers

[7] G.-R. Wang, C.-E. Tsai, H.-C. Cheng, and Y.-H. Li. Computing Augustin information via hybrid geodesically convex optimization. In *IEEE Int. Symp. Inf. Theory (ISIT)*, 2024.

[6] C.-E. Tsai, G.-R. Wang, H.-C. Cheng, and Y.-H. Li. Linear convergence in Hilbert's projective metric for computing Augustin information and a Rényi information measure. *arXiv preprint*, 2024.

[5] C.-E. Tsai, H.-C. Cheng, and Y.-H. Li. Fast minimization of expected logarithmic loss via stochastic dual averaging. In *Proc. Int. Conf. Artif. Intell. Stat. (AISTATS)*, 2024.

[4] C.-H. Hsia and C.-E. Tsai. On the synchronization analysis of a strong competition Kuramoto model. *arXiv preprint*, 2024.

[3] C.-E. Tsai, Y.-T. Lin, and Y.-H. Li. Data-dependent bounds for online portfolio selection without Lipschitzness and smoothness. In *Adv. Neural Inf. Process. Syst. (NeurIPS)*, 2023.

[2] C.-E. Tsai, H.-C. Cheng, and Y.-H. Li. Online self-concordant and relatively smooth minimization, with applications to online portfolio selection and learning quantum states. In *Proc. 34th Int. Conf. Algorithmic Learn. Theory (ALT)*, pages 1481–1483, 2023.

[1] C.-E. Tsai, H.-C. Cheng, and Y.-H. Li. Faster stochastic first-order method for maximum-likelihood quantum state tomography. In *Int. Conf. Quant. Inf. Process. (QIP)*, 2023.

Talks and Oral Presentations

08.2023 "Data-dependent bounds for online portfolio selection without Lipschitzness and smoothness." *Trends in AI Theory Seminar Series, MediaTek Research*.

02.2023 "Online self-concordant and relatively smooth minimization, with applications to online portfolio selection and learning quantum states." *ALT 2023*.

01.2023 "Learning quantum states with the log-loss." *Trends in AI Theory Seminar Series, MediaTek Research*.

06.2022 "Online portfolio selection and online entropic mirror descent." *Trends in AI Theory Seminar Series, MediaTek Research*.

Poster Presentations

05.2024 "Fast minimization of expected logarithmic loss via stochastic dual averaging." *AISTATS 2024*.

04.2024 "Data-dependent bounds for online portfolio selection without Lipschitzness and smoothness." *Workshop on Nonsmooth Optimization and Applications (NOPTA 2024)*.

01.2024 "Synchronization of Kuramoto model beyond sinusoidal interactions." *The 59th Annual Meeting of the Taiwanese Mathematical Society*.

01.2024 "Improved dimension and sample size scalability for maximum-likelihood state tomography and approximating PSD permanents." *QIP 2024*.

12.2023 "Data-dependent bounds for online portfolio selection without Lipschitzness and smoothness." *NeurIPS 2023*.

Awards

01.2024 Outstanding Paper Award. *The Mathematical Society of the Republic of China*.

06.2023 Appier's Research Award and Undergraduate Research Award. *Department of CSIE, NTU*.

12.2022 Dean's list. *Department of CSIE, NTU*.

06.2022 Undergraduate Research Award. *Department of CSIE, NTU*.

06.2020 Dean's list. *Department of CSIE, NTU*.

Selected Courses

ETH INFK	Probabilistic Artificial Intelligence / Natural Language Processing
ETH MATH	Linear and Combinatorial Optimization
NTU CSIE	Optimization Algorithms / Prediction, Learning, and Games / Online Convex Optimization / Optimization Methods for Deep Learning / Numerical Methods / Theoretical Aspects of Modern Cryptography
NTU MATH	Analysis I (honor program) / Algebra I and II (honor program) / Complex Analysis I (honor program) / Geometry I (honor program) / Introduction to ODE / Introduction to PDE
NTU EE	Information Theory / Convex Optimization / Quantum Information and Computation

"Namely, because the shape of the whole universe is the most perfect and, in fact, designed by the wisest creator, nothing in all the world will occur in which no maximum or minimum is somehow shining forth..."
— Leonhard Euler (1744)

Last update: 06.12.2024.