Chao-Kai Chiang

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Research Interests

- **Weakly Supervised Learning**: Developing principled methods for learning from imperfect, inexact, and inaccurate supervision to enable practical and scalable machine learning applications.
- **Learning with Label Noise**: Investigating the theoretical and empirical effects of label noise on clean and noisy confusion matrices, with the goal of designing robust and reliable learning algorithms.
- **Multi-Armed Bandits**: Studying regret minimization in adversarial and stochastic settings, with particular interest in best-of-both-worlds, contextual, dueling, and logit bandits.
- **Online Convex Optimization**: Analyzing regret bounds and convergence behavior in online learning, especially in benign or federated environments.

Education

National Taiwan University, Taipei, Taiwan
Ph.D. in Computer Science — January 2014
Dissertation Title: Toward Realistic Online Learning

National Tsing Hua University, Hsinchu, Taiwan
M.S. in Electrical Engineering — June 2006
B.S. in Computer Science — June 2004

Experience

The University of Tokyo, Tokyo, Japan
Project Assistant Professor with Professor Masashi Sugiyama in Sugiyama-Yokoya-Ishida Lab — 2021–2026

Appier Inc., Taipei, Taiwan
Data Scientist — 2019–2021

University of Southern California, Los Angeles, USA
Postdoctoral Scholar with Professor Fei Sha at the Department of Computer Science — 2017–2018

University of California, Los Angeles, Los Angeles, USA
Postdoctoral Scholar with Professor Fei Sha and Professor Ameet Talwalkar at the Computer Science Department — 2016–2017

University of Leoben, Leoben, Austria
Postdoctoral Fellow with Professor Peter Auer and Professor Ronald Ortner at the Chair for Information Technology — 2014–2016

Academia Sinica, Taipei, Taiwan
Research Assistant to Dr. Chi-Jen Lu in Computation Theory and Algorithm Lab — 2006–2014

National Taiwan University, Taipei, Taiwan
Research Assistant to Professor Hsuan-Tien Lin in Computational Learning Lab 2008–2014

Journal Papers

[2] **Chao-Kai Chiang** and Masashi Sugiyama, "Unified Risk Analysis for Weakly Supervised Learning," *Trans. Mach. Learn. Res.* 2025 (2025)

[1] Chia-Jung Lee, **Chao-Kai Chiang**, Mu-En Wu, "Online Learning Problems against Dynamic Strategies in Gradually Evolving Worlds," *J. Inf. Hiding Multim. Signal Process* 8(4): 869-879 (2017)

Refereed Conference Papers

In theoretical work, authors are typically listed alphabetically. Papers using alphabetical authorship are indicated with "(alphabetical order)."

[13] Okan Koc, Alexander Soen, **Chao-Kai Chiang**, and Masashi Sugiyama, "Domain Adaptation and Entanglement: an Optimal Transport Perspective," in *AISTATS* 2025: 3034-3042

[12] Jongyeong Lee, **Chao-Kai Chiang**, and Masashi Sugiyama, "The Choice of Noninformative Priors for Thompson Sampling in Multiparameter Bandit Models," in *AAAI* 2024: 13383-13390

[11] Xin-Qiang Cai, Yu-Jie Zhang, **Chao-Kai Chiang**, and Masashi Sugiyama, "Imitation Learning from Vague Feedback," in *NeurIPS* 2023

[10] Jongyeong Lee, Junya Honda, **Chao-Kai Chiang**, and Masashi Sugiyama, "Optimality of Thompson Sampling with Noninformative Priors for Pareto Bandits," in *ICML* 2023: 18810-18851

[9] Zhiyun Lu, Liyu Chen, **Chao-Kai Chiang**, and Fei Sha, "Hyper-parameter Tuning under a Budget Constraint," in *IJCAI* 2019: 5744-5750

[8] Virginia Smith, **Chao-Kai Chiang**, Maziar Sanjabi, and Ameet Talwalkar, "Federated Multi-Task Learning," in *NeurIPS* 2017: 4424-4434

[7] Peter Auer and **Chao-Kai Chiang** (alphabetical order), "An algorithm with nearly optimal pseudo-regret for both stochastic and adversarial bandits," in *COLT* 2016: 116-120

[6] Peter Auer, **Chao-Kai Chiang**, Ronald Ortner, and Madalina M. Drugan (alphabetical order for the first three authors), "Pareto Front Identification from Stochastic Bandit Feedback," in *AISTATS* 2016: 939-947

[5] Chia-Jung Lee, **Chao-Kai Chiang**, and Mu-En Wu, "Resisting Dynamic Strategies in Gradually Evolving Worlds," in *RVSP* 2015: 191-194

[4] Ku-Chun Chou, Hsuan-Tien Lin, **Chao-Kai Chiang**, and Chi-Jen Lu, "Pseudo-reward Algorithms for Contextual Bandits with Linear Payoff Functions," in *ACML* 2014

[3] **Chao-Kai Chiang**, Chia-Jung Lee, and Chi-Jen Lu (alphabetical order), "Beating Bandits in Gradually Evolving Worlds" in *COLT* 2013: 210-227

[2] **Chao-Kai Chiang**, Tianbao Yang, Chia-Jung Lee, Mehrdad Mahdavi, Chi-Jen Lu, Rong Jin, and Shenghuo Zhu, "Online Optimization with Gradual Variations," in *COLT* 2012: 6.1-6.20
Mark Fulk Best Student Paper Award

[1] **Chao-Kai Chiang** and Chi-Jen Lu (alphabetical order), "Online Learning with Queries," in *SODA* 2010: 616-629

Preprints

[4] **Chao-Kai Chiang**, Takashi Ishida, and Masashi Sugiyama, "LLM Routing with Dueling Feedback," arXiv:2510.00841

[3] Jongyeong Lee, **Chao-Kai Chiang**, and Masashi Sugiyama, "Asymptotically Optimal Thompson Sampling Based Policy for the Uniform Bandits and the Gaussian Bandits," arXiv:2302.14407v1

[2] Zhiyun Lu, **Chao-Kai Chiang**, and Fei Sha, "Hyper-parameter Tuning under a Budget Constraint," arXiv:1902.00532

[1] Peter Auer and **Chao-Kai Chiang** (alphabetical order), "An algorithm with nearly optimal pseudo-regret for both stochastic and adversarial bandits," arXiv:1605.08722

Teaching Experience

National Taiwan University, Taipei, Taiwan
Teaching assistant: Machine Learning — Fall 2010

The University of Tokyo, Tokyo, Japan
Coordinator and host: Research seminar — Fall 2022 – present
Coordinator and host: Student seminar — Spring 2022 – present

Mentoring

Donglin Qian — 2024
M.S. CS, UTokyo
Weakly supervised learning and learning with label noise

Yujie Zhang — 2023
Ph.D. Complexity, UTokyo
Applying weakly supervised learning to improve imitation learning

Xin-Qiang Cai — 2023
Ph.D. Complexity, UTokyo
Applying weakly supervised learning to improve imitation learning

Jongyeong Lee — 2022 – 2023
Ph.D. CS, UTokyo
Thompson sampling and prior selection
Thompson sampling on heavy-tailed distributions

Talks

Weakly Supervised Learning from a Contamination-Decontamination Perspective, Brisbane, Australia — November 2024
International Workshop on Weakly Supervised Learning 2024

Weakly Supervised Learning from a Unified Perspective, Tokyo, Japan — May 2024
The 60th Research Seminar at Institute for AI and Beyond

Introduction to Reinforcement Learning, California, USA November 2017
Guest lecture, CSCI567 Machine Learning

Online Optimization with Gradual Variations, Edinburgh, UK June 2012
COLT 2012

Online Learning with Queries, Austin, USA January 2010
SODA 2010

Selected Honors

- **Thesis Award**, Taiwanese Association for Artificial Intelligence (TAAI) 2014
- Students Conference Travel Grant, National Science Council 2010, 2012, 2013
- **Mark Fulk Best Student Paper Award**, Conference on Learning Theory (COLT) 2012

Collaborative Projects

JST ASPIRE for Top Scientists, Japan March 2025 – present
Mental Well-being Intelligence: A Community for Data-driven Mental Well-being Research

The Beyond AI Joint Project, Japan September 2021 – present
Automatic Learning of High Accurate Prediction Models from Limited Supervised Data

FWF project, Austria 2015 – 2016
Structured and Continuous Reinforcement Learning

European project CompLACS, Austria 2014 – 2015
Composing Learning for Artificial Cognitive Systems

Professional Activities

Journal Paper Reviewer

- IEEE Transactions on Pattern Analysis and Machine Intelligence
- Neural Networks

Conference Paper Reviewer

- AAAI Conference on Artificial Intelligence (AAAI) 2023–2026
- Conference on Artificial Intelligence and Statistics (AISTATS) 2023–2025
- Conference on Neural Information Processing Systems (NeurIPS) 2021–2025
- International Conference on Learning Representations (ICLR) 2022–2026
- International Conference on Machine Learning (ICML) 2023–2025
- Conference on Learning Theory (COLT) 2014
- Conference on Web and Internet Economics (WINE) 2014
- International Computing and Combinatorics Conference (COCOON) 2013

Symposium Organizer

- Southern California Machine Learning Symposium (Workflow chair, 2017)

References

Hsuan-Tien Lin, Professor
Department of Computer Science and Information Engineering
National Taiwan University
Taipei, Taiwan
htlin@csie.ntu.edu.tw

Chi-Jen Lu, Research Fellow
Institute of Information Science
Academia Sinica
Taipei, Taiwan
cjlu@iis.sinica.edu.tw

Peter Auer, Professor
Department of Mathematics and Information Technology
University of Leoben
Leoben, Austria
peter.auer@unileoben.ac.at

Ameet Talwalkar, Associate Professor
Machine Learning Department
Carnegie Mellon University
Pittsburgh, PA, USA
ameet.talwalkar.letters@gmail.com

Masashi Sugiyama, Director
RIKEN Center for Advanced Intelligence Project
Professor
Department of Computer Science
The University of Tokyo
Tokyo, Japan
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