

MERT KAYAALP

Adaptive Systems Lab, EPFL, Lausanne, Switzerland — mert.kayaalp@epfl.ch — Personal Website

RESEARCH INTERESTS

Machine learning, multi-agent decision-making, signal processing, systems and control, causal inference, social networks, time-series forecasting, inference over graphs

EDUCATION

Ph.D., École Polytechnique Fédérale de Lausanne (EPFL)

Computer and Communication Sciences

Thesis: Sequential Reasoning with Socially Caused Beliefs

Sep 2019 - Aug 2024

Lausanne, Switzerland

Advisor: Prof. Ali H. Sayed

B.S., Koç University

Electrical and Electronics Engineering, Summa Cum Laude

Sep 2015 - Jun 2019

Istanbul, Turkey

PUBLICATIONS

PRE-PRINTS

1. M. Kayaalp and A. H. Sayed, “Causal influences over social learning networks”, *under review*, arXiv:2307.09575

JOURNAL

1. P. Hu, V. Bordinon, M. Kayaalp, and A. H. Sayed, “Non-asymptotic performance of social machine learning under limited data”, *Signal Processing*, p. 109849, December 2024
2. M. Kayaalp, Y. Inan, V. Koivunen, and A. H. Sayed, “Causal influence in federated edge inference,” *IEEE Transactions on Signal Processing*, vol. 72, pp. 5604-5615, November 2024
3. V. Shumovskaia, M. Kayaalp, and A. H. Sayed, “Detection of malicious agents in social learning”, *IEEE Signal Processing Letters*, vol. 31, pp. 1745-1749, July 2024
4. V. Shumovskaia, M. Kayaalp, and A. H. Sayed, “Social learning in community structured graphs,” *IEEE Transactions on Signal Processing*, vol. 72, pp. 2812-2826, May 2024
5. M. Kayaalp, Y. Inan, E. Telatar, and A. H. Sayed, “On the arithmetic and geometric fusion of beliefs for distributed inference,” *IEEE Transactions on Automatic Control*, vol. 69, no. 4, pp. 2265-2280, April 2024
6. M. Kayaalp, V. Bordinon, and A. H. Sayed, “Social opinion formation and decision making under communication trends”, *IEEE Transactions on Signal Processing*, vol. 72, pp. 506-520, January 2024
7. M. Kayaalp, F. Ghadieh, and A. H. Sayed, “Policy evaluation in decentralized POMDPs with belief sharing,” *IEEE Open Journal of Control Systems*, vol. 2, pp. 125-145, June 2023
8. V. Shumovskaia, M. Kayaalp, M. Cemri, and A. H. Sayed, “Discovering influencers in opinion formation over social graphs,” *IEEE Open Journal of Signal Processing*, vol. 4, pp. 188-207, March 2023
9. M. Kayaalp, S. Vlaski, and A. H. Sayed, “Dif-MAML: Decentralized multi-agent meta-learning,” *IEEE Open Journal of Signal Processing*, vol. 3, pp. 71-93, January 2022

CONFERENCE

1. P. Hu, M. Kayaalp, and A. H. Sayed, “Optimal combination policies for error exponent maximization in social learning”, *IEEE ICASSP*, Hyderabad, India, April 2025
2. M. Kayaalp, Y. Inan, V. Koivunen, and A. H. Sayed, “Causal impact analysis for asynchronous decision making,” *IEEE ISIT*, Athens, Greece, July 2024
3. V. Shumovskaia, M. Kayaalp, and A. H. Sayed, “Distributed decision-making for community structured networks,” *IEEE ICASSP*, Seoul, Korea, April 2024
4. V. Bordinon, M. Kayaalp, V. Matta, and A. H. Sayed, “Social learning with non-Bayesian local updates,” *EU-SIPCO*, Helsinki, Finland, September 2023
5. M. Kayaalp, Y. Inan, V. Koivunen, E. Telatar, and A. H. Sayed, “On the fusion strategies for federated decision making,” *IEEE Statistical Signal Processing Workshop (SSP)*, Hanoi, Vietnam, July 2023, (**award winning article**).
6. V. Shumovskaia, M. Kayaalp, and A. H. Sayed, “Identifying opinion influencers over social networks,” *IEEE ICASSP*, Rhodes Island, Greece, June 2023
7. P. Hu, V. Bordinon, M. Kayaalp, and A. H. Sayed, “Performance of social machine learning under limited data,” *IEEE ICASSP*, Rhodes Island, Greece, June 2023
8. M. Cemri, V. Bordinon, M. Kayaalp, V. Shumovskaia, and A. H. Sayed, “Asynchronous social learning,” *IEEE ICASSP*, Rhodes Island, Greece, June 2023
9. Y. Inan, M. Kayaalp, E. Telatar, and A. H. Sayed, “Social learning under randomized collaborations,” *IEEE ISIT*, Helsinki, Finland, June 2022
10. M. Kayaalp, V. Bordinon, S. Vlaski, and A. H. Sayed, “Hidden Markov modeling over graphs,” *IEEE Data Science and Learning Workshop (DSLW)*, Singapore, May 2022
11. Y. Inan, M. Kayaalp, A. H. Sayed, and E. Telatar, “A fundamental limit of distributed hypothesis testing under memoryless quantization,” *IEEE ICC*, Seoul, South Korea, May 2022
12. M. Kayaalp, S. Vlaski, and A. H. Sayed, “Distributed meta-learning with networked agents,” *EUSIPCO*, Dublin, Ireland, August 2021

THESIS

1. M. Kayaalp, “Sequential Reasoning with Socially Caused Beliefs”, *École Polytechnique Fédérale de Lausanne*

EXPERIENCE

Applied Scientist Intern , Amazon Web Services Research internship in Machine Learning and Time Series Forecasting Team	Sep 2024 - Jan 2025 Berlin, Germany
Research and Teaching Assistant , Adaptive Systems Laboratory, EPFL Thesis: Sequential Reasoning with Socially Caused Beliefs	Sep 2019 - Aug 2024 Lausanne, Switzerland
Research Internship , Tandon School of Engineering, New York University Research assistant in the Communication and Information Theory (CommIT) Group	Jun 2018 - Sep 2018 New York, US
Software Engineer Intern , Comodo Cybersecurity Contribution to database migration project with Java and MongoDB	Jun 2017 - Jul 2017 Ankara, Turkey

HONORS AND AWARDS

Best Student Paper Award – IEEE Statistical Signal Processing Workshop	Hanoi, Vietnam, Jul 2023
Rising Stars in Signal Processing - IEEE ICASSP	Rhodes, Greece, Jun 2023
EPFL EDIC Fellowship - For the first year of PhD studies	Sep 2019 - Sep 2020
Vehbi Koç Honor Awardee - Awarded to students achieving the highest GPAs	Feb 2016 - Jun 2019
Semahat Arsel Scholar - Full tuition scholarship with stipend for top performers in LYS	Sep 2015 - Jun 2019
Bronze Medal - International Physics Olympiad (IPhO)	Mumbai, India, Jul 2015
Silver Medal - National Physics Olympiad (Turkish National Science Foundation)	Dec 2014, Dec 2013
Turkish National University Entrance Examination (LYS) 1st out of 1.8 million participants	Jun 2015

TEACHING

Teaching assistant

Information, Computation and Communication (BS)	Fall 2021, 2023
Adaptation and Learning (MS)	Spring 2022
Advanced Machine Learning (MS)	Spring 2021
Large-Scale Data Science for Real-World Data (MS)	Spring 2020
Analysis I (BS)	Fall 2020

Mentorship

Adrian Karol Fluder, BS, EPFL	Summer 2024
Bianca Pitu, BS, EPFL	Summer 2024
Luca Pana, BS, EPFL	Spring 2024
Stefan Taga, BS, EPFL	Spring 2024
Eduardo Faria Cabrera, BS, University of Sao Paulo, Brazil	Fall 2023
Elyas Benyamina, MS, Université Pierre et Marie Curie (UPMC), France	Summer 2023
Mert Cemri, BS, Bilkent University, Turkey	Summer 2022
Ching-Fang Li, MS, National Taiwan University, Taiwan	Summer 2022
Fatima Ghadieh, BS, American University of Beirut, Lebanon	Summer 2022

SELECTED TALKS AND CONFERENCES

- “Decision Making in an Interconnected and Modular World”, *Poster presentation at Princeton Workshop on Optimization, Learning, and Control*, Princeton, June 2024
- “Mathematical Models of Social Opinion Formation”, *Invited talk at EPFL-Polympiads*, Lausanne, April 2024
- “Collaborative Decision Making over Ad-hoc Networks”, *Invited talk at Ford Otosan Automotive Technologies Laboratory*, Online, December 2023
- “On the Fusion Strategies for Federated Decision Making”, *Poster presentation at IEEE SSP*, Hanoi, July 2023
- “Interpretable and Socially Intelligent Systems”, *Poster presentation at Rising Stars in Signal Processing Workshop, IEEE ICASSP*, Rhodes, June 2023
- “Asynchronous Social Learning”, *Poster presentation at IEEE ICASSP*, Rhodes, June 2023
- “Social Learning under Randomized Collaborations”, *Oral presentation at IEEE ISIT*, Helsinki, July 2022
- “Hidden Markov Modeling over Graphs”, *Oral presentation at IEEE DSLW*, Online, May 2022
- “Distributed Meta-Learning with Networked Agents”, *Oral presentation at EUSIPCO*, Online, August 2021

SERVICE

Reviewer for IEEE ICASSP (International Conference on Acoustics, Speech and Signal Processing), IEEE CDC (Conference on Decision and Control), IEEE ISIT (International Symposium on Information Theory), IEEE Signal Processing Letters, Digital Signal Processing, IEEE Transactions on Mobile Computing, AISTATS (International Conference on Artificial Intelligence and Statistics), IEEE Open Journal of Signal Processing, IEEE Transactions on Signal Processing, Signal Processing, Journal of Machine Learning Research