Sadamori Kojaku

Assistant Professor at School of Systems Science and Industrial Engineering
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Education

Ph.D. Computer Science Sep. 2013 – Sep. 2015
Hokkaido University, Japan (Thesis supervisor: Prof. Mineichi Kudo)

M.S. System Engineering Apr. 2010 – Mar. 2012
Hokkaido University, Japan (Thesis supervisor: Prof. Hajime Igarashi)

B.S. System Engineering Apr. 2007 – Mar. 2010
Hokkaido University, Japan (Thesis supervisor: Prof. Hajime Igarashi)

Experience

Assistant Professor Aug. 2023 – Present
Systems Science and Industrial Engineering, Binghamton University *Binghamton, USA*

- Conducting research in the field of complex systems and network science
- Supervising Three Ph.D. students in their dissertations and research projects
- Teaching two graduate courses in Systems Science and Industrial Engineering

Postdoctoral Research Fellow Feb. 2020 – Jul. 2023
School of Informatics, Computing, and Engineering, Indiana University *Bloomington, USA*

- Developed algorithms for analyzing large-scale data on scholarly data
- Mentored one Master and several Ph.D. students in their research projects
- Teaching a graduate course on Data Visualization

Specially Appointed Professor (Postdoc) Apr. 2019 – Jan. 2020
Research Institute for Economics and Business Administration, Kobe University *Kobe, Japan*

- Developed a search engine for finding relevant reviewers for a paper (patented)
- Mentored one Ph.D student in developing their research proposals and methodologies

Research Associate Apr. 2016 – Mar. 2019
Department of Engineering Mathematics, University of Bristol *Bristol, UK*

- Conducted research on complex networks

Papers under review

(BU students underlined; my name in italics)

[A1] Yu Tian and *Sadamori Kojaku* and Hiroki Sayama and Renaud Lambiotte. Matrix-weighted networks for modeling multidimensional dynamics. arXiv:2410.05188. 2024

[A2] Rachith Aiyappa, Xin Wang, Munjung Kim, Ozgur Can Seckin, Jisung Yoon, Yong-Yeol Ahn, *Sadamori Kojaku*. Implicit degree bias in the link prediction task. *Preprint arXiv*, 2405.14985 2024.

[A3] *Sadamori Kojaku**[1], Robert Mahari*, Sandro Lera, Esteban Moro, Alex Pentland, Yong-Yeol Ahn. Uncovering the universal dynamics of citation systems: From science of science to law of law and patterns of patents. 2024.

[1] Equal contribution

[A4] Isabel Constantino, *Sadamori Kojaku*, Santo Fortunato, and Yong-Yeol Ahn. "Representing the Disciplinary Structure of Physics: A Comparative Evaluation of Graph and Text Embedding Methods," *Preprint arXiv*, 2308.15706, 2023.

Manuscript in preparation

(BU students underlined; my name in italics)

[B1] Mario Franco, *Sadamori Kojaku*, and Carlos Gershenson. Is vanilla is enough, why d we need chocolate and strawberry? A Neapolitan approach to artificial neural networks.

[B2] Xuanchi Li, Xin Wang, and *Sadamori Kojaku*. A contrastive learning for network inference

[B3] Dheeraj Tommondru, Xuanchi Li, Xin Wang, and *Sadamori Kojaku*. Feature selection method based on the adversarial dismantling of feature networks

[B4] Yu Tian, *Sadamori Kojaku*, Hiroki Sayama, and Renaud Lambiotte. Matrix-weighted networks.

[B5] Filipi N. Silva, *Sadamori Kojaku*, Alessandro Framini, Filippo Radicchi, Santo Fortunato. A scale dependence of weighted networks.

[B6] Munjung Kim, *Sadamori Kojaku*, Yong-Yeol Ahn. A continuous embedding measure of disruptiveness reveals hidden simultaneous disruption.

Peer reviewed journal papers

[C1] *Sadamori Kojaku*, Filippo Radicchi, Yong-Yeol Ahn, and Santo Fortunato. Network community detection via neural embeddings. Nature Communications. 15, no. 1 (2024): 9446.

[C2] Bianka Kovács, *Sadamori Kojaku*, Gergely Palla, Santo Fortunato. Iterative embedding and reweighting of complex networks reveals community structure. *Scientific Reports*, 17184, 2024

[C3] Dakota Murray, Jisung Yoon, *Sadamori Kojaku*, Rodrigo Costas, Woo-Sung Jung, Staša Milojević, and Yong-Yeol Ahn. Unsupervised embedding of trajectories captures the latent structure of mobility. *PNAS*, 2023

[C4] *Sadamori Kojaku*, Giacomo Livan, and Naoki Masuda. Detecting anomalous citation groups in journal networks. *Scientific Reports*, 11, 14524, 2021 (2-year IF: 3.998)

[C5] *Sadamori Kojaku*, Laurent Hébert-Dufresne, Enys Mones, Sune Lehmann, and Yong-Yeol Ahn. The effectiveness of backward contact tracing in networks. *Nature Physics*, 1745-2481, 2021 (2-year IF: 19.256)

[C6] *Sadamori Kojaku* and Naoki Masuda. Constructing networks by filtering correlation matrices: A null model approach. *Proceedings of the Royal Society A*, 475, 2231, 2019 (2-year IF: 2.741)

[C7] *Sadamori Kojaku*, Mengqiao Xu, Haoxiang Xia, and Naoki Masuda. Multiscale core-periphery structure in a global liner shipping network. *Scientific Reports*, 9, 404, 2019 (2-year IF: 3.998)

[C8] *Sadamori Kojaku*, Giulio Cimini, Guido Caldarelli, and Naoki Masuda. Structural changes in the interbank market across the financial crisis from multiple core-periphery analysis. *Journal of Network Theory in Finance*, 4, 33-51, 2018

[C9] Naoki Masuda, *Sadamori Kojaku*, and Yukie Sano. A configuration model for correlation matrices. *Physical Review E*, 98, 012312, 2018 (2-year IF: 2.296)

[C10] *Sadamori Kojaku* and Naoki Masuda. A generalised significance test for individual communities in networks. *Scientific Reports*, 8, 7351, 2018 (2-year IF: 3.998)

[C11] *Sadamori Kojaku* and Naoki Masuda. Core-periphery structure requires something else in the network. *New Journal of Physics*, 20, 043012, 2018 (2-year IF: 3.539)

[C12] *Sadamori Kojaku* and Naoki Masuda. Finding multiple core-periphery pairs in networks. *Physical Review E*, 96, 052313, 2017 (2-year IF: 2.296)

[C13] *Sadamori Kojaku*, Ichigaku Takigawa, Mineichi Kudo, and Hideyuki Imai. Dense core model for cohesive subgraph discovery. *Social Networks*, 44, 143-152, 2016 (2-year IF: 2.376)

[C14] *Sadamori Kojaku*, Kota Watanabe, Hajime Igarashi. Rational Forgettable Profit Sharing Reinforcement Learning. IEEJ, 3, 448-454, 2012. (original in Japanese).

[C15] *Sadamori Koujaku*, Kota Watanabe, and Hajime Igarashi. Adaptive profit sharing reinforcement learning for dynamic environment. 10th International Conference on Machine Learning and Applications and Workshops. Hawaii, the United States, 2011

Peer reviewed full conference papers

[D1] *Sadamori Kojaku*, Jisung Yoon, Isabel Constantino, and Yong-Yeol Ahn. Residual2Vec: Debiasing graph embedding with random graphs. NeurIPS, 2021 (acceptance rate 26%).

[D2] Xia Cui, *Sadamori Kojaku*, Naoki Masuda, and Danushka Bollegala. Solving feature spareness in text classification using core-periphery decomposition. In Proceedings of the 7th Joint Conference on Lexical and Computational Semantics, pages 225-264, ACL, New Orleans, USA, June 5-6, 2018.

[D3] *Sadamori Koujaku*, Mineichi Kudo, Ichigaku Takigawa, and Hideyuki Imai. Community change detection in dynamic networks in noisy environment. The 24th International Conference on World Wide Web, Florence, Italy, May 18 - 22, 2015.

[D4] *Sadamori Koujaku*, Mineichi Kudo, Ichigaku Takigawa, and Hideyuki Imai. Structural change point detection for social networks. The World Congress on Engineering, London, the United Kingdom, July 3-5, 2013.

Commentary

[E1] *Sadamori Kojaku*, New developments in network science through embedding methods. Special Issue "Frontiers of Complex Network Research" Journal of the Society of Instrument and Control Engineers, 65, 5, 185-191 (2021)

Invited Talks

[F1] *Sadamori Kojaku*. Neural embeddings unveil simplicity in complex systems. American Physical Society March Meeting, Minneapolis, MN, USA, March 4 - 8, 2024.

[F2] *Sadamori Kojaku*. Distilling rich but crude scholarly data using representation learning, IUNI Lunch Colloquium: Science of Science and Networks, Indiana, USA, October 28, 2022.

[F3] *Sadamori Kojaku*, Jisung Yoon, Isabel Constantino, and Yong-Yeol Ahn. Residual2Vec: Debiasing graph embedding with random graphs. Network Inequality, International School and Conference on Network Science (NetSci) 2022, Shanghai, China, July 21, 2022.

[F4] *Sadamori Kojaku*. Algorithms for detecting network cores and their applications. Network Science Seminar, Institute of Statistical Mathematics, Japan, August 28-30, 2019.

[F5] *Sadamori Kojaku*, Laurent Hébert-Dufresne, Enys Mones, Sune Lehmann, and Yong-Yeol Ahn. The effectiveness of backward contact tracing in networks. The State University of New York at Buffalo, June 4, 2021.

Oral Presentations & Poster Presentations (Refereed)

(BU students underlined; my name in italics)

Oral Presentations

[G1] *[2]*Sadamori Kojaku*, Robert Mahari, Sandro Lera, Esteban Moro, Alex Pentland, Yong-Yeol Ahn. Uncovering the universal dynamics of citation systems: From science of science to law of law and patterns of patents. NERCCS, Clarkson, NY, USA, March 20 - 22, 2024,

[G2] *Sadamori Kojaku*, *Robert Mahari, Sandro Lera, Esteban Moro, Alex Pentland, Yong-Yeol Ahn. Uncovering the universal dynamics of citation systems: From science of science to law of law and patterns of patents. International School and Conference on Network Science (NetSci), Vienna, Austria, Jul 12 - 14, 2023.

[G3] *Sadamori Kojaku*, *Robert Mahari, Sandro Lera, Esteban Moro, Alex Pentland, Yong-Yeol Ahn. Uncovering the universal dynamics of citation systems: From science of science to law of law and patterns of patents. ICSSI, Chicago, IL, USA, June 26 - 29, 2023.

[G4] *Sadamori Kojaku*, Filippo Radicchi, Yong-Yeol Ahn, and Santo Fortunato. Network community detection via neural embeddings. International School and Conference on Network Science (NetSci), Vienna, Austria, Jul 12 - 14, 2023.

[G5] **Sadamori Kojaku*, Clara Boothby, Filipi Nascimento Silva, Attila Varga, Xiaoran Yan, Staša Milojević, Alessandro Flammini, Filippo Menczer, and Yong-Yeol Ahn. Maping Scientific Foraging. ICSSI. Washington D.C., USA, 6-9 June 2022.

[G6] **Sadamori Kojaku*, Xiaoran Yan, Jisung Yoon, Filipi N. Silva, Vincent Lariviere, and Yong-Yeol Ahn. DisamBERT: author name disambiguation with BERT. ICSSI. Washington D.C., USA, 6-9 June 2022.

[G7] **Sadamori Kojaku*, Laurent Hébert-Dufresne, Enys Mones, Sune Lehmann, and Yong-Yeol Ahn. The effectiveness of backward contact tracing in networks. International School and Conference on Network Science (NetSci). Virtual, 05-10 July 2021.

[G8] **Sadamori Kojaku*, Jisung Yoon, and Yong-Yeol Ahn. Residual2Vec: A null model approach for graph embedding. International School and Conference on Network Science (NetSci). Virtual, 05-10 July 2021.

[G9] Dakota Murray, *Jisung Yoon, *Sadamori Kojaku*, Rodrigo Costas, Woo-Sung Jung, Staša Milojević, and Yong-Yeol Ahn. Unsupervised embedding of trajectories captures the latent structure of mobility. International School and Conference on Network Science (NetSci). Virtual, 05-10 July 2021.

[2] * refers to the presenter

[G10] *_Sadamori Kojaku_, Attila Varga, Xiaoran Yan, Filipi N. Silva, Staša Milojević, Alessandro Flammini, and Yong-Yeol Ahn. The landscape of the COVID-19 research: A neural embedding approach. International School and Conference on Network Science (NetSci). Rome, Italy, 17-25 September 2020.

[G11] *_Sadamori Kojaku_, Giacomo Livan, and Naoki Masuda. Detecting citation cartels in journal networks. International School and Conference on Network Science (NetSci). Rome, Italy, 17-25 September 2020.

[G12] *_Sadamori Kojaku_, Giulio Cimini, Guido Caldarelli, and Naoki Masuda. Structural changes in the interbank market across the financial crisis from multiple core-periphery analysis. International School and Conference on Network Science (NetSci). Vermont, U.S., May 26-31 2019.

[G13] *_Sadamori Kojaku_ and Naoki Masuda. Core-periphery structure in degree-heterogeneous networks. International School and Conference on Network Science (NetSci-X). Hangzhou, China 2018.

[G14] *_Sadamori Kojaku_ and Naoki Masuda. Finding multiple core-periphery structure with random walks. 5th International Workshop on Complex Networks and their Applications. Milan, Italy November 30-December 2 2016.

[G15] *Keigo Kimura, Mineichi Kudo, Lu Sun, and _Sadamori Kojaku_. Fast random k-labelsets for large-scale multi-label classification. 23rd International Conference on Pattern Recognition. Cancun, Mexico December 4-8 2016.

Poster Presentations

[G16] *Xin Wang and _Sadamori Kojaku_. User Trust Modeling in Conversational User Interface Based on Word Embedding Bias. The ACM Conference on Conversational User Interfaces. July 8 - 10, 2024.

[G17] *Govind Gandhi, Yong-Yeol Ahn, and _Sadamori Kojaku_. Self-Supervised Modularity Maximization using graph embeddings for clustering. International School and Conference on Network Science (NetSci), Quebec, Canada, June 16 - 21, 2024.

[G18] *Xin Wang and _Sadamori Kojaku_. Analyzing Patient Reviews on Google Map Hospital Profiles through Neural Embedding and Network Modeling. NERCCS, Clarkson, NY, USA, March 20 - 22, 2024.

[G19] Ashutosh Tiwari, **Sadamori Kojaku* and Yong-Yeol Ahn. A biased contrastive learning debiases graph neural networks. International School and Conference on Network Science (NetSci). Vienna, Austria, Jul 12 - 14, 2023.

[G20] *_Sadamori Kojaku_, Clara Boothby, Filipi Nascimento Silva, Attila Varga, Xiaoran Yan, Staša Milojević, Alessandro Flammini, Filippo Menczer, and Yong-Yeol Ahn. Understanding the landscape of COVID-19 research by using neural embedding. ICSSI. Chicago, IL, USA, June 26 - 29, 2023.

[G21] *Munjung Kim, _Sadamori Kojaku_, and Yong-Yeol Ahn. Quantifying disruptiveness using a neural embedding method. ICSSI. Chicago, IL, USA, June 26 - 29, 2023.

[G22] **Sadamori Kojaku* and Naoki Masuda. Constructing networks from correlation matrices: An application to economical data. Threshold Networks. Nottingham, UK, July 22-24, 2019.

[G23] **Sadamori Kojaku* and Naoki Masuda. A generalised significance test for individual communities in networks. International School and Conference on Network Science (NetSci). Paris, France, June 11–15, 2018.

[G24] **Sadamori Kojaku* and Naoki Masuda. Multi-scale organisation of core-periphery structure in networks. 1st Latin American Conference on Complex Networks. Puebla, Mexico, September 25-29, 2017.

[G25] **Sadamori Kojaku* and Naoki Masuda. Core-periphery structure of networks: Consideration for random heterogeneous networks. International School and Conference on Network Science (NetSci). Indianapolis, Indiana, USA, 2017.

[G26] **Sadamori Kojaku* and Naoki Masuda. An extension of modularity for finding multiple core/periphery structure in networks. International School and Conference on Network Science (NetSci-X). Tel Aviv, Israel, January 15-18, 2017.

Grants

Received

[H1] PI: *Sadamori Kojaku*, Giulio Cimini. Co-PI: Guido Caldarelli, Daigo Uemoto, and Takashi Kamihigashi. Project: Correlation-based reconstruction of financial networks for systemic risk control. Funded by JSPS Bilateral Exchange Program. 2020. 8,000,000 JPY (withdrawn due to transition to a U.S. institution)

Submitted

[H2] PI: *Sadamori Kojaku*. Co-PI: Dakota Murray at Northeastern and Yong-Yeol Ahn at Indiana University. HNDS-I: Charting intellectual space: an infrastructure for a unified, interpretable, cross-domain embedding of intellectual mobility. Submitted to NSF HNDS-I. 819k USD (319k USD for Binghamton).

[H3] PI: *Sadamori Kojaku*. Co-PI: Naoki Masuda at University at Buffalo and Hiroki Sayama at Binghamton University. Collaborative Research: ATD: Charting threat landscape with an interpretable multi-modal embedding of spatiotemporal data. Submitted to NSF ATD. 264k USD (190k USD for Binghamton)

[H4] PI: Co-PI: Luis Rocha at Binghamton University and *Sadamori Kojaku*. Complex Network Exploration through Backbone-Enhanced Techniques with Intelligent Support. Submitted to NSF-ANR. (600k USD for Binghamton)

In preparation

[H5] PI: *Sadamori Kojaku*. NSF CAREER Program. Universal representation of intellectual mobility in science, technology, and society. 2025. Participated in Commit-to-Submit (C2S) program in Binghamton University.

Patents

[I1] *Sadamori Kojaku* and Takashi Kamihigashi. Academic paper reviewer search device, reviewer search method, and reviewer search program. 2024 [International Patent 7470369. Japan Patent Office]

[I2] *Sadamori Kojaku* and Takayuki Osogami. Prediction method, prediction system and program. 2013 [International Patent No: 9087294. USPTO].

Honors

- Outstanding Faculty Award from Students with Disabilities. Binghamton University. 2024
- Best Contribution on Financial Networks Award. International School and Conference on Network Science (NetSci-X). [1/58 presenters]. 2017
- Dean Award. *Graduate School of Information Science and Technology, Hokkaido Univ.* 2015
- Best Student Award. *The World Congress on Engineering* 2013

Teaching

SSIE 419/519 Applied Soft Computing. Instructor (Spring 2024). Binghamton University

SSIE 641 Advanced Topics in Network Science. Instructor (Fall 2023). Binghamton University

BL-INFO-I590 Data Visualization. Instructor (Fall 2023). Indiana University.

Student Opinion Of Teaching (SOOT) Survey Percentages

Course	Term	Q1 (%)	Q2 (%)	Q3 (%)	Q4 (%)	Q5 (%)	Q6 (%)	Q7 (%)	Q8 (%)	Q9 (%)
SSIE 519	Spring 24 (3 responses)	100	100	100	100	100	100	100	100	100
SSIE 641	Fall 23 (5 responses)	60	60	40	40	60	100	80	60	80

Table 1: Percentage of "High" and "Very High" responses for each question in the Student Opinion Of Teaching (SOOT) Survey

PhD Student Guidance Committee

(As Advisor or Co-Advisor)

Xin (Vision) Wang (SS), Expected to Graduate in 2026.

Luke Netto (SS), Expected to Graduate in 2026.

Xuanchi Li (SS), Expected to Graduate in 2026.

MS Student Guidance Committee

(As a commitee member)

Miriam Flores (SS). The Impact of Autonomous Vehicles on Traffic Flow. Expected to Graduate in 2024.

International and Professional Services

[I3] Chair of Rep4CS, a satellite workshop on Representation learning for complex systems, as a part of Conference on Complex Systems 2024 at Exeter in UK.

[I4] Organizer of NetSci-X 2020, International School and Conference on Network Science in Tokyo. 2020.

[I5] Program Committee Member in International School and Conference on Network Science (NetSci) (2019, 2020, 2021, 2022, 2023).

[I6] Referee for Nature Human Behavior; Nature Communications; Scientific Reports; Journal of Complex Networks; Journal of Computational Social Science; PLOS ONE; ECAI

Service within the University

[J1] Talk at Data Salon. Machine learns simplicity from complexity. Nov 17, 2023.

[J2] Talk at DataViz Pi Day 2024 Presentations and Networking. A Landscape of All Sciences: Neural Networks of Over 400M Publications. March 14, 2023.