

Xiaohan Kang

RESEARCH SCIENTIST · SOFTWARE ENGINEER

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Work Experience

University of Illinois at Urbana-Champaign

Urbana, IL

POSTDOCTORAL RESEARCH ASSOCIATE, DEPT. OF ELECTRICAL AND COMPUTER ENGINEERING, ADVISOR: PROF. BRUCE HAJEK

Mar. 2016–present

- Investigated fundamental limits on binary classification errors and causal network inference.
- Developed CausNet, a Python package for gene regulatory network reconstruction using time-series RNA-seq data.
- Taught ECE 313 (Probability with Engineering Applications, 60+ students).

Cisco Systems, Inc.

San Jose, CA

SOFTWARE ENGINEERING INTERN

May–Aug. 2015

- Developed a Django-based web app for debugging networking applications.

Education

Arizona State University

Tempe, AZ

PH.D. IN ELECTRICAL ENGINEERING, ADVISOR: PROF. LEI YING

2015

Tsinghua University

Beijing, China

B.E. IN ELECTRONIC ENGINEERING

2009

Skills

PYTHON, UNIX, GIT, C/C++, MATLAB, R, DJANGO, HUGO, PYTORCH

Research Projects

Fundamental limits on binary classification errors and causal network inference

- Derived a maximum likelihood estimator of the receiver operating characteristic curve for a binary classification problem.
- Provided a lower bound on the information requirements for causal network inference.

Gene regulatory network reconstruction

- Developed CausNet, a framework for sparse causal network reconstruction using a Gaussian approximation of bootstrapping to provide reliability scores for predicted regulatory interactions.
- Studied the importance of condition diversity in time series experiments where each individual is only sampled once (one-shot sampling).
- Explored the connection between ODE models and graph models for gene regulatory networks.

Scheduling algorithms in computer and communication networks

- Analyzed low-complexity algorithms for scheduling real-time traffic in wireless networks.
- Proposed batch-filling, a randomized load balancing algorithm for large computing systems with strong performance guarantees and low messaging overhead.

Publications

Conference publications

- [C9] Bruce Hajek and Xiaohan Kang, “Maximum likelihood estimation of optimal receiver operating characteristic curves from likelihood ratio observations,” *IEEE International Symposium on Information Theory (ISIT)*, 2022. [DOI] [arXiv]
- [C8] Xiaohan Kang and Bruce Hajek, “Lower bounds on information requirements for causal network inference,” *IEEE International Symposium on Information Theory (ISIT)*, 2021. [DOI] [arXiv]
- [C7] Honghao Wei, Xiaohan Kang, Weina Wang, and Lei Ying, “QuickStop: A Markov optimal stopping approach for quickest misinformation detection,” *ACM International Conference on Measurement and Analysis of Computer Systems (SIGMETRICS)*, 2019. [DOI] [arXiv]
- [C6] Xiaohan Kang, I-Hong Hou, and Lei Ying, “On the capacity requirement of largest-deficit-first for scheduling real-time traffic in wireless networks,” *ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)*, 2015. [DOI]
- [C5] Lei Ying, R. Srikant, and Xiaohan Kang, “The power of slightly more than one sample in randomized load balancing,” *IEEE Conference on Computer Communications (INFOCOM)*, 2015. (Best Paper Award) [DOI]
- [C4] Xiaohan Kang, Juan José Jaramillo, and Lei Ying, “Stability of longest-queue-first scheduling in linear wireless networks with multihop traffic and one-hop interference,” *IEEE Conference on Decision and Control (CDC)*, 2013. [DOI]
- [C3] Xiaohan Kang, Weina Wang, Juan José Jaramillo, and Lei Ying, “On the performance of largest-deficit-first for scheduling real-time traffic in wireless networks,” *ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)*, 2013. [DOI]
- [C2] Xiaohan Kang, Juan José Jaramillo, and Lei Ying, “Impacts of peer churn on P2P streaming networks,” *Annual Allerton Conference on Communication, Control and Computing (Allerton)*, 2012. [DOI]
- [C1] Xiaohan Kang, Juan José Jaramillo, “A strategy-proof and non-monetary admission control mechanism for wireless access networks,” *International Conference on Heterogeneous Networking for Quality, Reliability, Security and Robustness (QShine)*, 2010. [DOI]

Journal publications

- [J6] Xiaohan Kang, Bruce Hajek, and Yoshie Hanzawa, “From graph topology to ODE models for gene regulatory networks,” *PLOS ONE*, vol. 15, no. 6, pp. e0235070, 2020. [DOI]
- [J5] Faqiang Wu, Xiaohan Kang, Minglei Wang, Waseem Haider, William B. Price, Bruce Hajek, and Yoshie Hanzawa, “Transcriptome-enabled network inference revealed the *GmCOL1* feed-forward loop and its roles in photoperiodic flowering of soybean,” *Frontiers in Plant Science*, vol. 10, pp. 1221, 2019. [DOI]
- [J4] Xiaohan Kang, Bruce Hajek, Faqiang Wu, and Yoshie Hanzawa, “Time series experiment design under one-shot sampling: The importance of condition diversity,” *PLOS ONE*, vol. 14, no. 10, pp. e0224577, 2019. [DOI]
- [J3] Lei Ying, R. Srikant, and Xiaohan Kang, “The power of slightly more than one sample in randomized load balancing,” *Mathematics of Operations Research*, vol. 42, no. 3, pp. 692–722, 2017. [DOI]
- [J2] Xiaohan Kang, Weina Wang, Juan José Jaramillo, and Lei Ying, “On the performance of largest-deficit-first for scheduling real-time traffic in wireless networks,” *IEEE/ACM Transactions on Networking*, vol. 24, pp. 72–84, Feb. 2016. [DOI]
- [J1] Xiaohan Kang, Juan José Jaramillo, Lei Ying, “Stability of longest-queue-first scheduling in linear wireless networks with multihop traffic and one-hop interference,” *Queueing Systems*, vol. 80, no. 3, pp. 273–291, Jul. 2015. [DOI]

Selected talks

- [T10] “Finite-sample lower bounds on information requirements for causal network inference,” *BIRS CMO Workshop on Learning in Networks: Performance Limits and Algorithms*, invited talk, Oaxaca, Mexico, 2022.
- [T9] “Lower bounds on information requirements for causal network inference,” *INFORMS Annual Meeting*, invited talk, Anaheim, CA, 2021.
- [T8] “On modeling the circadian clock gene regulatory network in soybean,” *Finding Your Inner Modeler Workshop IV (FYIM)*, University of Illinois at Chicago, Chicago, IL (virtual), 2021.
- [T7] “Time series experimental design under one-shot sampling: The importance of condition diversity,” *Energy & Information Systems Seminar*, invited talk, Carnegie Mellon University, Pittsburgh, PA, 2019.
- [T6] “On the challenge of gene regulatory network reconstruction from high-throughput sequencing data,” *Network Science Seminar Series*, invited talk, Arizona State University, Tempe, AZ, 2018.
- [T5] “CausNet: a causal inference algorithm for gene regulatory network reconstruction,” *The Plant and Animal Genome XXVI Conference (PAG 2018)*, San Diego, CA, 2018.
- [T4] “The power of slightly more than one sample in randomized load balancing,” *SINE Seminar*, invited talk, University of Illinois at Urbana-Champaign, Urbana, IL, 2016.
- [T3] “The power of slightly more than one sample in randomized load balancing,” guest lecture (hosted by Prof. Rhonda Righter), University of California, Berkeley, Berkeley, CA, 2016.
- [T2] “The power of slightly more than one sample in randomized load balancing,” *INFORMS Annual Meeting*, invited talk, Philadelphia, PA, 2015.
- [T1] “On the performance of largest-deficit-first for scheduling real-time traffic in wireless networks,” invited talk (hosted by Prof. Eytan Modiano), Massachusetts Institute of Technology, MA, 2015.

Honors & Awards

2019	Helmsley Fellowship , Frontiers and Techniques in Plant Science Course, Cold Spring Harbor Laboratory	<i>Laurel Hollow, NY</i>
2015	The First Place Team , Cisco Intern Hackathon	<i>San Jose, CA</i>
2015	Best Paper Award , IEEE Conference on Computer Communications (INFOCOM)	<i>Hong Kong, China</i>
2014	Exemplary Reviewer , IEEE Communications Letters	

Professional Service

- Reviewer for *IEEE/ACM Transactions on Networking*, *Queueing Systems*, *IEEE Transactions on Mobile Computing*, *IEEE Communications Letters*, *IEEE Transactions on Vehicular Technology*, *IEEE Signal Processing Letters*, *IEEE Transactions on Network Science and Engineering*, and *IEEE International Symposium on Information Theory*.
- Technical Program Committee member for *ACM MobiHoc* 2019–2022, and *WiOpt* 2021.