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	*Laurel Hollow, NY*
2015	**The First Place Team,** Cisco Intern Hackathon	*San Jose, CA*
2015	**Best Paper Award,** IEEE Conference on Computer Communications (INFOCOM)	*Hong Kong, China*
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.