Xin Liu

Contact Information

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Research Interests

Load balancing in data centers, scheduling in ride-sharing,
routing in communication networks, stochastic analysis and optimization

Education

Arizona State University
Ph.D. Student in Electrical Engineering, Aug. 2014 – Now
Advisor: Prof. Lei Ying

University of Chinese Academy of Sciences
M.S. in Signal and Information Processing, Sept. 2011 – Jul. 2014
Advisor: Prof. Haibing Wang

Hunan University
B.E. in Electrical Engineering (Honors), Aug. 2007 – Jul. 2011

Projects

"Zero-delay" Load Balancing in Large-Scale Server System

- Analyzed load balancing policies under the heavy traffic regime and exponential service time, and proved a sufficient condition for "zero-delay" load balancing.
- Working on the generalization of the exponential service time assumption (e.g. Coxian-2) for a class of "zero-delay" load balancing.

Empty-car Routing in Ridesharing

- Approximated stochastic empty-car routing as a fluid optimization problem, relaxed it into a linear programming (LP), and proved LP relaxation is tight.
- Evaluated empty-car routing policies with real traffic and network topology from dataset released by DiDi Chuxing, the results improve the demand-supply gap.

Real-Time Routing for Multi-hop Networks

- Proposed spatial-temporal routing for end-to-end deadline constrained traffic in communication networks and proved its optimality under periodic traffic pattern.
- Incorporated a resource-pooling heuristic into spatial-temporal routing and validated its efficiency for stochastic real-time video transmission in Abilene network.

Presentations

"Fluid-Model-Based Car Routing for Modern Ridesharing Systems"
- Poster at SIGMETRICS, Urbana-Champaign, Illinois, June, 2017

"On Achieving Zero Delay with Power-of-d-Choices Load Balancing"
- INFORMS Annual Meeting, Houston, Texas, Oct. 2017
- INFOCOM, Honolulu, Hawaii, Apr. 2018

"Steady-State Analysis of Load Balancing Algorithms in the Sub-Halfin-Whitt Regime"
- INFORMS Annual Meeting, Phoenix, Arizona, Nov. 2018
- Poster at NSF Cyber-Physical System Meeting, Alexandria, Virginia, Nov. 2018

Honors and Awards

INFOCOM paper invited for a fast review to IEEE Transactions on Network Science and Engineering (7 out of 312 accepted papers) 2018
Best Student Paper at CHINACOM 2013
Excellent Bachelor Thesis, Hunan University 2011

Publications

X. Liu and L. Ying. *Steady-State Analysis of Load Balancing Algorithms in the Sub-Halfin-Whitt Regime.* SIGMETRICS MAMA Workshop, Irvine, CA, 2018 (Submitted to Journal of Applied Probability and in Round2 review).

X. Liu and L. Ying. *On achieving zero delay with power-of-d-choices load balancing.* In Proc. IEEE International Conference on Computer Communications (INFOCOM), Honolulu, Hawaii, 2018. Fast-Track Review for IEEE Transactions on Network Science and Engineering (7 out of 312 accepted papers were invited).

Y. Liu, **X. Liu**, L. Ying, and R. Srikant. *Wireless scheduling with deadline and power constraints.* 2018 Annual Conference on Information Science and Systems (CISS), Princeton, NJ, 2018. (Submitted to IEEE/ACM Transactions on Networking and in revision).

A. Braverman, J. G. Dai, **X. Liu**, and L. Ying. *Fluid-model-based car routing for modern ridesharing systems.* (Extended abstract) SIGMETRICS, Urbana-Champaign, Illinois, June, 2017.

A. Braverman, J. G. Dai, **X. Liu**, and L. Ying. *Empty-car routing in ridesharing.* Operations Research (Upcoming).

X. Liu and L. Ying. *Spatial-temporal routing for supporting end-to-end hard deadlines in multi-hop networks.* 2016 Annual Conference on Information Science and Systems (CISS), Princeton, NJ, 2016. (Submitted to Performance Evaluation and in Round2 review).

X. Liu, F. Gao, G. Wang, and X. Wang. *Joint beamforming and user selection in multicast downlink channel under secrecy-outage constraint.* IEEE Communications Letters 18 (1), 82-85, 2014.

X. Liu, H. Li, and H. Wang. *Probability constrained robust multicast beamforming in cognitive radio network.* 8th International Conference on Communications and Networking in China (CHINACOM), Guilin, 2013. (Best Student Paper)

Industry Experience

Internship in Cardinal Operation, Inc., Shanghai, China, Summer, 2018

Professional Service

Reviewer for IEEE/ACM Transactions on Networking, Performance Evaluation , IEEE Journal on Selected Areas in Communications, IEEE Communications Letters, MobiHoc, INFOCOM, WiOpt.