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, and reinforcement learning

Education

Arizona State University
Ph.D. Student in Electrical Engineering, Aug. 2014 – Fall. 2019
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 delay performance of load balancing algorithms in large-scale server system under critical load traffic conditions.
- Established a set of efficient load balancing algorithms (e.g. power-of-d-choices) can provide "zero-delay" service and response to user requests instantly.

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 algorithm 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. *On Universal Scaling of Distributed Queues under Load Balancing.* (Submitted to SIGMETRICS 2020).

A. Braverman, J. G. Dai, **X. Liu**, and L. Ying. *Empty-car routing in ridesharing systems.* Operations Research, Aug., 2019.

X. Liu and L. Ying. *Spatial-temporal routing for supporting end-to-end hard deadlines in multi-hop networks.* Performance Evaluation, July, 2019.

X. Liu and L. Ying. *Steady-State Analysis of Load Balancing Algorithms in the Sub-Halfin-Whitt Regime.* Mathematical Performance Modeling and Analysis Workshop in Sigmetrics, Irvine, California, 2018 (Round2 review in Journal of Applied Probability).

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. (Round2 review in IEEE/ACM Transactions on Networking).

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

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, Jan., 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, Aug., 2013. (Best Student Paper)

Industry Experience

Internship in Cardinal Operation (Shanshu), 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.

Skills

Python, C/C++, Matlab, Mathematica, CVX, Gurobi, NumPy, Pandas, PyTorch, VHDL, Xilinx FPGA, Altium Designer, LaTeX.