Hongcheng Liu

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Affiliation

University of Florida   **Gainesville, FL**
Assistant Professor of Industrial & Systems Engineering   *Aug. 2017 – present*

Education

The Pennsylvania State University   **University Park, PA**
Ph.D. in Industrial Engineering with Dual Title in Operations Research   *Aug. 2010 – Aug. 2015*
Dissertation topic: Nonsmooth optimization with its applications in network design and machine learning.

Huazhong University of Science and Technology   **Wuhan, Hubei, China**
B.Sc. in Industrial and Manufacturing System Engineering   *Aug. 2006 – May. 2010*
Thesis: A hybrid particle swarm optimization with estimation of distribution algorithm for flowshop scheduling.
• *Best thesis award of Hubei province*

Former affiliation

Stanford University   **Stanford, CA**
Postdoctoral research fellow in Radiation Physics   *Sept. 2015 – Aug. 2017*
Supervisor: Lei Xing
• *Optimization and learning in radiation therapy treatment planning*

Research Interests

• Optimization, learning, & applications in medical decision-making & traffic modeling
• High-dimensional statistical/machine learning   • Operations and logistics

Publications

Citation count: 436 by Google Scholar. Paper counts: 20 journal (**J**); 3 conference (**C**); 3 under review (**U**)

- **High-Dimensional Learning Theories**

    J1 **H. Liu**, T. Yao, R. Li, 2016. Global solutions to high-dimensional nonconvex learning with folded concave penalties. *The Annals of Statistics* 44(2), 629-659.

    J2 **H. Liu**, T. Yao, R. Li, Y. Ye, 2017. Folded concave penalized sparse linear regression: sparsity, statistical performance, and algorithmic theory for local solutions. *Mathematical Programming Series A.* http://dx.doi.org/10.1007/s10107-017-1114-y.

    U3 **H. Liu**, H. Lee, 2018. Linearly constrained high-dimensional learning. *Working paper*

- **Optimization Theory**

    J4 **H. Liu**, X. Wang, T. Yao, R. Li, Y. Ye, 2018. Sample average approximation with sparsity-inducing penalty for high-dimensional stochastic programming. Forthcoming in *Mathematical Programming Series A.* Online at: https://doi.org/10.1007/s10107-018-1278-0

    J5 G. Haeser, **H. Liu**, Y. Ye, 2018. Optimality condition and complexity analysis for linearly-constrained optimization without differentiability on the boundary. Accepted by *Mathematical Programming Series A.*

- **Medical Decision-Making Applications**

    J6 H. Wang, P. Dong, **H. Liu**, L. Xing, 2017. Development of an autonomous treatment planning strategy for radiation therapy with effective use of population-based prior data. *Medical Physics* 44, 389-396.

    J7 **H. Liu**, P. Dong, L. Xing, 2017. A new sparse optimization scheme for simultaneous beam angle and fluence map optimization in radiotherapy planning. *Physics in Medicine and Biology* 62(16), 6428-6445.

    J8 **H. Liu**, P. Dong, L. Xing, 2017. Using measurable dosimetric quantities to characterize the inter-structural tradeoff in inverse planning. *Physics in Medicine and Biology* 62(16), 6804-6821.

    J9 S. Ren, **H. Liu**, C. Tan, F. Tong, 2017. Tomographic wire-mesh imaging of water-air flow based on sparse minimization. *IEEE Sensors Journal* 18(24), 8187-8195.

    J10 **H. Liu**, G. Du, L. Zhang, M. Lewis, X. Wang, T. Yao, R. Li, X. Huang, 2016. Folded concave penalized learning in identifying multimodal MRI marker for parkinson's disease. *Journal of Neuroscience Methods* 268, 1-6.

    J11 **H. Liu**, L. Xing, 2018. Isodose Feature-Preserving Voxelization (IFPV) for Radiation Therapy Treatment Planning. Accepted by *Medical Physics (Letters).*

    J12 P. Dong, **H. Liu,** and L. Xing, 2018. Monte Carlo tree search-based non-coplanar trajectory design for station parameter optimized radiation therapy (SPORT). Accepted by *Physics in medicine and biology.*

U13 **H. Liu**, X. Chen, B. Lu, 2018. A new inverse planning formalism with explicit DVH constraints and kurtosis-based dosimetric criteria. Major revision by *Physics in Medicine and Biology*.

U14 **H. Liu**, L. Xing, 2018. Extraction of spatial and dosimetric features of isodose distribution(s) and its application in treatment plan optimization. Under review by *Physics in Medicine and Biology*.

- **Simulation and Optimization for Traffic Management or Other Problems**

J15 **H. Liu**, K. Han, V.V. Gayah, T.L. Friesz, T. Yao, 2015. Data-driven linear decision rule for distributionally robust optimization of on-line signal control. *Transportation Research Part C* 59, 260-277.
  - Podium presentation in 21st International Symposium on Transportation and Traffic Theory, Kobe, Japan, 5-7 August, 2015.

J16 K. Han, **H. Liu**, V. Gayah, T.L. Friesz, T. Yao, 2016. A robust optimization approach for dynamic traffic signal control with emission constraints. *Transportation Research Part C.* 70, 3-26.

J17 K. Han, Y. Sun, **H. Liu**, T.L. Friesz, T. Yao, 2015. A bi-level model of dynamic traffic signal control with continuum approximation. *Transportation Research Part C: Emerging Technologies* 55, 409-431.

J18 Y. Wang, **H. Liu**, K. Han, T.L. Friesz, T. Yao, 2015. Day-to-day congestion pricing and network resilience. *Transportmetrica A: Transport Science* 11, 873-895.

J19 K. Han, T.L. Friesz, W.Y. Szeto, **H. Liu**, 2015. Elastic demand dynamic network user equilibrium: Formulation, existence and computation. *Transportation Research Part B: Methodological* 81, 183-209.

J20 B. D. Chung, T. Yao, T. L. Friesz, **H. Liu**, 2012. Dynamic congestion pricing with demand uncertainty: a robust optimization approach. *Transportation Research Part B Methodological* 46(10), 1504-1518.

J21 T. Yao, B. Jiang, **H. Liu**, 2012. Impact of economic and technical uncertainties on dynamic new product development. *IEEE Transactions on Engineering Management* 60(1), 157-168.

J22 **H. Liu**, L. Gao, Q.-K. Pan, 2011. A hybrid particle swarm optimization with estimation of distribution algorithm for solving permutation flowshop scheduling problem. *Expert Systems with Applications* 38(4), 4348-4360.

J23 Y. Shi, **H. Liu**, L. Gao, G. Zhang, 2011. Cellular particle swarm optimization. *Information Sciences* 181(20), 4460-4493.

C24 A. Thorsen, **H. Liu**, T. Yao, 2013. Robust inventory control under lead time uncertainty. 2013 Industrial and Systems Engineering Research Conference.
  - *Best Paper Award, Supply Chain and Logistics Track. IIE Conference*

C25 T. L. Friesz, K. Han, **H. Liu**, T. Yao, 2013. Dynamic congestion and tolls with mobile source emission. *The 20th International Symposium on Transportation and Traffic Theory (ISTTT)*.

C26 **H. Liu**, L. Gao, 2010. A discrete electromagnetism-like mechanism algorithm for solving distributed permutation flowshop scheduling problem. *2010 International Conference on Manufacturing Automation*.

Industrial Research / Internship Experience

IBM Watson Research Center Summer research intern • Yorktown Heights, N.Y., May 2014-August 2014.
Project: Parallel optimization algorithms for training deep neural networks.

Presentations

1. Robust and dynamic congestion pricing with demand uncertainty. INFORMS annual meeting 2011
2. A bilevel particle swarm optimization approach for robust and dynamic congestion pricing. Transportation Research Board annual meeting 2012
3. Urban freight transportation planning: a dynamic Stackelberg game-theoretic approach. DTA 2012
4. A Robust Optimization Approach for Adaptive Traffic Signal Control with Emission Constraints. INFORMS annual meeting 2013
5. Dynamic Model of Urban Freight Flows and Demand Formation. INFORMS annual meeting 2013
6. Dynamic User Equilibrium with Elastic Demand and Bounded Rationality: Formulation, Qualitative Analysis, and Computation. INFORMS annual meeting 2013
7. Second Order Models and Traffic Data from Mobile Sensors. INFORMS annual meeting 2013
8. Data-driven linear decision rule for real-time distributionally robust signal control. INFORMS annual meeting 2014
9. Folded Concave Penalized Sparse Linear Regression: Complexity, Sparsity and Statistical Guarantee. ISMP 2015
10. A new inverse planning framework with principle-based modeling of inter-structural dosimetric tradeoff. American Association of Physicists in Medicine (AAPM) 2016

11. Sample average approximation with sparsity-inducing penalty for high-dimensional stochastic programming. INFORMS 2017
12. A new sparse optimization scheme for simultaneous beam angle and fluence map optimization in radiotherapy planning. AAPM 2017
13. Second order necessary conditions in linearly constrained high-dimensional learning. INFORMS Optimization Society Meeting 2018

Selected Awards

1. 2013 • Best Paper Award, Supply Chain and Logistics Track • IIE Industrial and Systems Engineering Research Conference
2. 2012 • Marcus Fellowship • Department of Industrial and Manufacturing Engineering, Penn State University
3. 2012 • DTA 2012 Fellowship. Travel fund • 4th International Symposium on Dynamic Traffic Assignment, Martha's Vineyard, Massachusetts, USA
4. 2009 • National Scholarship • Ministry of Education of China

Service Activities

1. Session Chair of Cluster *Sparse Optimization and Compressed Sensing - Contributed I* • ISMP 2015
2. Chair of Session *Statistical Optimization: Computational and Statistical Tradeoffs* • INFORMS Optimization Society Conference 2018

Teaching

ESI 6417: Linear Programming and Network Optimization. 2018 Spring. Dept. of Industrial and Systems Engineering, University of Florida

References

Available upon request.