Cun (Matthew) Mu

(646)-468-8259
matthew.mu@jet.com

Education

2011–2017 **Doctor of Philosophy**, *Operations Research, Columbia University*, New York.
Advisors: Prof. Donald Goldfarb and Prof. John Wright

2007–2011 **Bachelor of Science with Double Majors**, *Quantitative Finance & Statistics, National University of Singapore*, Singapore.

Work Experience

Jan. 2017 – present **Senior Data Scientist**, *Jet.com/WalmartLabs*, 221 River Street, Hoboken, NJ.

- Researched and developed visual search system on top of full-text search engine, to better facilitate multimedia search and recommendation in eCommerce [3]
- Researched and productionized collaborative filtering techniques into Jet's recommendation system to enhance customers' shopping experience
- Designed shipping boxes for Walmart eCommerce, leading to $20 million reduction in transportation cost and shipping material cost [2]

Oct. 2016 – Dec. 2016 **Consultant**, *Jet.com/WalmartLabs*, 221 River Street, Hoboken, NJ.

- Developed and executed a data-driven approach for the supply chain team to better order products from Procter & Gamble (P&G), leading to 80%-reduction in out-of-inventory rate and 30%-reduction in operational cost
- Renovated the order packing algorithm for the fulfillment team based on mixed integer optimization, leading to 2%-reduction in the number of boxes and 5%-increase in the space utilization rate

May 2015 – Aug. 2015 **Research Intern**, *NEC Laboratories America, Inc.*, Princeton, NJ.

- Designed a novel decentralized and fault-tolerant optimization algorithm to coordinate multi-core systems and clusters over peer-to-peer netowrk
- Published one conference paper [8] and filed one patent [14]

Sep 2011 – Dec. 2016 **Teaching Assistant**, *Columbia Univeristy*, New York, NY.

- Prepared recitation sessions, exam questions and solutions for a variety of Ph.D., master and undergraduate classes
- List of courses TAed: Optimization I (Ph.D. core course), Non-Linear Optimization, Simulation, Financial Engineering, Stochastic Models and Deterministic Models

Research Interest

Optimization theories and algorithms with applications in data science and artificial intelligence. Recent research includes deep learning, computer vision and natural language processing.

Publications

Google Scholar citations: 568 as of Mar 02, 2019. Please refer to my Google Scholar page for updated figures: `https://scholar.google.com/citations?user=Aqf-7YOAAAAJ&hl=en`

[1] **Cun Mu**, Guang Yang, and Zheng Yan. "Revisiting skip-gram negative sampling model with rectification, " *To appear in Proceedings of Computing Conference*, 2019.

[2] Guang Yang, **Cun Mu**. "A Machine Learning Approach to Shipping Box Design," *To appear in Proceedings of Intelligent Systems Conference*, 2019.

[3] **Cun Mu**, Jun Zhao, Guang Yang, Jing Zhang and Zheng Yan. "Towards practical visual search engine

within Elasticsearch," *Proceedings of ACM Special Interest Group on Information Retrieval (SIGIR) Workshop on eCommerce*, 2018.

[4] Donald Goldfarb, **Cun Mu**, John Wright and Chaoxu Zhou, "Using negative curvature in solving nonlinear programs," *Computational Optimization and Applications*, vol. 68, no. 3, pp. 479-502, 2017.

[5] **Cun Mu**, Daniel Hsu and Donald Goldfarb, "Greedy approaches to symmetric orthogonal tensor decomposition," *SIAM Journal on Matrix Analysis and Applications*, vol. 38, no. 4, pp. 1210-1226, 2017.

[6] **Cun Mu**, Yuqian Zhang, John Wright, and Donald Goldfarb, "Scalable robust matrix recovery: Frank-Wolfe meets proximal methods," *SIAM Journal on Scientific Computing*, vol. 38, no. 5, pp. A3291-A3317, 2016.

[7] Bo Huang, **Cun Mu**, Donald Goldfarb, John Wright, "Provable models for robust low-rank tensor completion," *Pacific Journal of Optimization*, vol. 11, no. 2, pp. 339–364, 2015.

[8] **Cun Mu**, Daniel Hsu and Donald Goldfarb, "Successive rank-one approximations for nearly orthogonally decomposable symmetric tensors," *SIAM Journal on Matrix Analysis and Applications*, vol. 36, no. 4, pp. 1638-1659, 2015.

[9] **Cun Mu**, Asim Kadav, Erik Kruus, Donald Goldfarb, and Renqiang Min. "Random walk distributed dual averaging method for decentralized consensus optimization, " *Advances in Neural Information Processing Systems (NIPS) Optimization Workshop*, 2015.

[10] Wei Liu, **Cun Mu**, Rongrong Ji, Shiqian Ma, John R. Smith, and Shih-Fu Chang. "Low-rank similarity metric learning in high dimensions," *Proceedings of AAAI Conference on Artificial Intelligence*, 2015.

[11] Wei Liu, **Cun Mu**, Sanjiv Kumar, and Shih-Fu Chang. "Discrete graph hashing," *Advances in Neural Information Processing Systems (NIPS)*, 2014.

[12] **Cun Mu**, Bo Huang, John Wright, and Donald Goldfarb. "Square deal: Lower bounds and improved relaxations for tensor recovery," *Proceedings of International Conference on Machine Learning (ICML)*, 2014.

[13] Yuqian Zhang, **Cun Mu**, Han-Wen Kuo, and John Wright. "Toward guaranteed illumination models for non-convex objects," *Proceedings of IEEE International Conference on Computer Vision (ICCV)*, 2013.

Patent Application

[14] Asim Kadav, Renqiang Min, Erik Kruus, and **Cun Mu**. "System and method for fault-tolerant parallel learning over non-i.i.d. data," *United States patent application US 15/296,560.6*, 2017.

Invited Talks

Jul 2018	ACM SIGIR Workshop on eCommerce, Ann Arbor, MI
Jul 2016	SIAM Annual Meeting, Boston, MA
Jan 2015	Microsoft Research, New York, NY
Nov 2014	INFORMS, San Francisco, CA
Jun 2014	International Conference on Machine Learning, Beijing, China
May 2014	SIAM Conference on Optimization, San Diego, CA
Feb 2014	Department of Math, UCLA, Los Angeles, CA

Academic Services

Jan 2019	Reviewer for Pattern Recognition
Jan 2019	Reviewer for Neural Computing

Dec 2019	Reviewer for Journal of Visual Communication and Image Representation (JVCI)
Dec 2018	Reviewer for Neural Computing
Nov 2018	Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
Aug 2018	Reviewer for Journal of Computational Mathematics (JCM)
Aug 2018	Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
Jul 2018	Member of Program Committee for AAAI Conference on Artificial Intelligence (AAAI)
Jul 2018	Reviewer for SIAM Journal on Matrix Analysis and Applications (SIMAX)
Apr 2018	Reviewer for SIAM Journal on Imaging Sciences (SIIMS)
Sep 2017	Reviewer for SIAM Journal on Scientific Computing (SISC)
Dec 2016	Reviewer for ACM Symposium on the Theory of Computing (STOC)
Nov 2014	Reviewer for Pacific Journal of Optimization (PJO)
Aug 2014	Reviewer for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
Aug 2014	Reviewer for Math Programming
Apr 2014	Reviewer for IEEE Conference on Decision and Control (CDC)

Awards & Recognitions

2019	Honoree of Elastic Search Cluster Award for Technology Innovation [link]
2019	Finalist, Caterpillar and INFORMS Analytics Society Innovative Applications of Analytics Award, the Analytics Society of the Institute for Operations Research and the Management Sciences (INFORMS) [link]
2019	Semi-Finalist, Franz Edelman Award, INFORMS
2014	Class of 1988 Doctoral Fellowship, Columbia University
2014	Travel Award, International Conference on Machine Learning (ICML)
2011	Lee Kuan Yew Gold Medel, National Univeristy of Singapore
2011	Singapore Mathematical Society Medal and Prize, National Univeristy of Singapore
2011	Lijen Industrial Development Medals, National Univeristy of Singapore
2007-2010	Deans Honor List, Faculty of Science, National Univeristy of Singapore

Computer Skills

Operating Systems	Unix/Linux, Mac OS, Windows
Programming Languages	Python, R, Matlab, SQL, LaTeX

(update: Mar 02, 2019)