

Jingkai Yan

CONTACT INFORMATION	+1 (646) 288-4873	jy2927@columbia.edu
RESEARCH INTERESTS	Machine learning, neural networks, high-dimensional data analysis	
EDUCATION	Columbia University , New York, NY M.S./Ph.D. Student, <i>Department of Electrical Engineering</i> <ul style="list-style-type: none">• GPA: 4.08/4.00• Advisor: Dr. John Wright	Sep 2018 - Present
	Tsinghua University , Beijing, China B.E. in <i>Electrical Engineering</i> with Honors <ul style="list-style-type: none">• GPA: 95.2/100, rank 1/235	Sep 2014 - Jul 2018
PHD RESEARCH EXPERIENCE	Advisor: Dr. John Wright LIGO Gravitational Wave Identification with Neural Networks <p>Theoretically analyzed the performance of currently employed matched filter and the alternative neural-network-based methods. Constructed a software pipeline for LIGO gravitational wave signal identification using convolutional neural networks, which could achieve target accuracy at computational complexities two orders of magnitude lower than the current methodology used in LIGO.</p> Faster Continuous Line Scans for Chemical Microscopy <p>Improved existing algorithms in continuous-line-probe chemical microscopy by modeling the signal distortions at high scan rates, and designing compressed sensing algorithms for signal reconstruction. The newly designed algorithm allows for chemical imaging at speed two orders of magnitude faster than conventional microscopic methods. Also enhanced the software package provided to practitioners for continuous line scan microscopy.</p>	
UNDERGRADUATE RESEARCH EXPERIENCE	Advisor: Dr. Yuantao Gu On the Outage Probability Conjecture of MIMO Channels <p>Found certain insufficient validity of a conjecture regarding the outage probability of MIMO channels; where the original conjecture had been trusted for decades with over 10,000 times' citation for the original paper. Provided a new analytical approach to the problem and identified counter-examples. Presented a detailed discussion on circumstances when the original conjecture would still work.</p> A General Framework for Understanding Compressed Subspace Clustering Algorithms <p>Established the connection between compressed subspace clustering and noisy subspace clustering. Proposed a general framework for analyzing the performance of various subspace clustering algorithms when applied to compressed data. Analyzed the performance of the most commonly used subspace clustering algorithms using the proposed framework.</p> Information Theoretic Lower Bound of Restricted Isometry Property Constant <p>Presented a tight lower bound for the RIP constant, for the first time in the literature. Demonstrated that the lower bound is at the same order as the upper bound, verified by numerical simulations.</p>	
PUBLICATIONS	<ul style="list-style-type: none">• Li, G., Yan, J. and Gu, Y., 2019, May. Information Theoretic Lower Bound of Restricted Isometry Property Constant. In <i>ICASSP 2019-2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)</i> (pp. 5297-5301). IEEE.• Meng, L., Li, G., Yan, J. and Gu, Y., 2018. A General Framework for Understanding Compressed Subspace Clustering Algorithms. <i>IEEE Journal of Selected Topics in Signal Processing</i>, 12(6), pp.1504-1519	

- Li, G., **Yan, J.** and Gu, Y., 2018, June. Outage Probability Conjecture Does Not Hold for Two-Input-Multiple-Output (TIMO) System. In *2018 IEEE International Symposium on Information Theory (ISIT)* (pp. 1345-1349). IEEE.

HONORS & AWARDS

- Wei Foundation Scholar 2018 - Present
- Tang-Lixin Scholarship (*Highest award available to seniors*) 2017
- Tsinghua “12-9” Scholarship (*Highest award available to juniors*) 2016
- Qualcomm Fellowship 2016
- Meritorious Award, Interdisciplinary Contest in Modeling 2016
- National Endeavor Scholarship, Ministry of Education of China 2015
- Silver Medal, the 28th and 29th Chinese Mathematical Olympiad 2013 & 2014

TEACHING AND LEADERSHIP

Association for Science and Innovation, Tsinghua Sep 2015 - Jan 2018
 Organized school-level programming competition ” *TeamStyle 17*”. Developed the online competition platform.
 Presented regular lectures on software usage (git, LaTeX, etc).

COMPUTER SKILLS

- Matlab, Python, PyTorch, R
- Git, L^AT_EX, MS Office, ArcGIS

RELATED COURSEWORK

- Convex Optimization, Machine Learning, Machine Learning Theory, Bayesian Models in Machine Learning, Sparse Representation and High-dimensional Geometry, Probability Theory