

Hao-Jun Michael Shi

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RESEARCH INTERESTS

Optimization • Deep Learning • Machine Learning • Signal Processing

EDUCATION

NORTHWESTERN UNIVERSITY
PHD IN INDUSTRIAL ENGINEERING AND
MANAGEMENT SCIENCES
Expected June 2021 | Evanston, IL
Advisor: Jorge Nocedal

**MS IN INDUSTRIAL ENGINEERING AND
MANAGEMENT SCIENCES**
December 2017 | Evanston, IL
Cumulative GPA: 3.92/4.00

**UNIVERSITY OF CALIFORNIA,
LOS ANGELES**
BS IN APPLIED MATHEMATICS
June 2016 | Los Angeles, CA
Cumulative GPA: 3.77/4.00
College and Departmental Honors
Dean's Honors List (9 quarters)

AWARDS

NSF Graduate Research Fellowship
Honorable Mention (2016, 2017)

Walter P. Murphy Fellowship (2016-17)

IEMS Departmental Service Award
(2016-17, 2017-18)

SKILLS

SOFTWARE/LANGUAGES

Python • C++ • Matlab • AMPL • SQL •
LaTeX • Git • Gurobi

RELATED PACKAGES

NumPy • SciPy • scikit-learn • PyTorch •
Keras • Tensorflow

EXPERIENCE

NORTHWESTERN UNIVERSITY

RESEARCH ASSISTANT

April 2017 - Present | Evanston, IL

- Developing second-order optimization algorithms for training deep neural networks.
- Developing robust interior point methods for nonlinear programming.
- Investigating adaptive gradient or diagonal scaling methods for nonlinear programming.
- Funded by Intel grant.
- Advisor: Jorge Nocedal

UNIVERSITY OF CALIFORNIA, LOS ANGELES

UNDERGRADUATE RESEARCHER

December 2014 - June 2016 | Los Angeles, CA

- Investigated performance of different variants of coordinate descent for different applications.
- Wrote primer on coordinate descent algorithms for optimization practitioners.
- Advisor: Wotao Yin

CALIFORNIA RESEARCH TRAINING PROGRAM IN COMPUTATIONAL AND APPLIED MATHEMATICS

UNDERGRADUATE RESEARCHER

June 2015 - August 2015 | Los Angeles, CA

- Developed improved methods for reconstructing sparse signals from quantized measurements.
- Cataloged performance of quantized compressed sensing algorithms for a given bit-depth, sparsity, and noise level.
- Advisor: Deanna Needell

CALIFORNIA RESEARCH TRAINING PROGRAM IN COMPUTATIONAL AND APPLIED MATHEMATICS

UNDERGRADUATE RESEARCHER

June 2014 - August 2014 | Los Angeles, CA

- Developed dimensionality reduction algorithms that preserve normalized pairwise distances between datapoints.
- Advisor: Ming Yan

UCLA MATHEMATICS DEPARTMENT

READER

September 2013 - March 2014 | Los Angeles, CA

- Graded homework and quizzes for Calculus for Life Sciences (Math 3A) and Probability for Life Sciences (Math 3C)

COURSEWORK

Applied Mathematical Statistics (IEMS 401)
Stochastic Simulation (IEMS 435)
Mathematical Optimization II (IEMS 450-2)
Stochastic Optimization (IEMS 451)
Combinatorial Optimization (IEMS 452)
Large Scale Optimization (IEMS 454)
Convex Optimization (IEMS 459)
Distributed Optimization (EECS 424)
Probabilistic Graphical Models (EECS 474)
Statistical Learning for Sequential Decision Making (OPNS 525)

TEACHING

IEMS 455: Machine Learning
Grader/Teaching Assistant (Spring 2018)
IEMS 1st Year Boot Camp: Analysis
Instructor (Summer 2017)

OTHER ACTIVITIES

Northwestern INFORMS
Webmaster (2017 - 2018)
Member (2016 - Present)
Neural Information Processing Systems
Reviewer (2018)
International Conference on Learning Representations
Reviewer (2018)

PUBLICATIONS

CONFERENCE PROCEEDINGS

1. R. Bollapragada, D. Mudigere, J. Nocedal, H.J.M. Shi, and P.T.P. Tang. "A Progressive Batching L-BFGS Method for Machine Learning". International Conference on Machine Learning (ICML), Stockholm, Sweden, July 2018. [ArXiv Link]
2. H.J.M. Shi, M. Case, X. Gu, S. Tu, and D. Needell. "Methods for Quantized Compressed Sensing". Proc. Information Theory and Applications (ITA), La Jolla, CA, Jan. 2016. [ITA Link].

JOURNAL PUBLICATIONS

1. J. Luo, K. Shapiro, H.J.M. Shi, Q. Yang, and K. Zhu. "Practical Algorithms for Learning Near-Isometric Linear Embeddings". SIAM Undergraduate Research Online, vol. 9, 2016. [SIURO Link].

TECHNICAL REPORTS

1. H.J.M. Shi, S. Tu, Y. Xu, and W. Yin. "A Primer on Coordinate Descent Algorithms". Preprint. [ArXiv Link].
2. X. Gu, S. Tu, H.J.M. Shi, M. Case, D. Needell, and Y. Plan. "Optimizing Quantization for Lasso Recovery". IEEE Signal Processing Letters, vol. 25, issue 1, Jan. 2018. [IEEE Link].
3. C. Abrahamson, H.J.M. Shi, and B. Yang. "Ground Motion Prediction Equations for Arias Intensity Consistent with the NGA-West2 Ground Motion Models". Pacific Earthquake Engineering Research (PEER) Report, July 2016. [PEER Report Link].

PRESENTATIONS

ORAL PRESENTATIONS

1. H.J.M. Shi. "A Progressive Batching L-BFGS Method for Machine Learning". Chicago Area SIAM Student Conference 2018, Chicago, Illinois, Apr. 2018.

POSTER PRESENTATIONS

1. R. Bollapragada, D. Mudigere, J. Nocedal, H.J.M. Shi, and P.T.P. Tang. "A Progressive Batching L-BFGS Method for Machine Learning". Midwest Machine Learning Symposium 2018, Chicago, Illinois, June 2018.
2. J. Luo, K. Shapiro, H.J.M. Shi, Q. Yang, and K. Zhu. "Learning Near-Isometric Linear Embeddings". Joint Mathematics Meetings 2015, San Antonio, Texas, Jan. 2015.