Shanshan Wu

Email: shanshan@utexas.edu Webpage: http://wushanshan.github.io/

Education

University of Texas at Austin Aug. 2014 – Aug. 2019 (expected)

- Ph.D., Electrical & Computer Engineering, GPA: 4.0/4.0
- Advisors: Prof. Sujay Sanghavi and Prof. Alexandros G. Dimakis
- **Research interests**: large-scale machine learning, optimization, high-dimensional statistics, neural architecture design

Shanghai Jiao Tong University Sept. 2011 – Mar. 2014

- M.S., Electronics Science & Technology, GPA: 3.95/4.0 (rank: 1/25)

Shanghai Jiao Tong University Sept. 2007 – July 2011

- B.S., Electrical & Computer Engineering, GPA: 3.94/4.0 (rank: 1/134)

Industrial Experience

Software Engineer Intern in Research | Google *New York City, NY* June 2018 – Aug. 2018

- Implemented and benchmarked the state-of-the-art kernel learning algorithm.
- Proposed several ideas to improve the algorithm.
- Contributed this algorithm to the TensorFlow codebase.

Software Engineer Intern in Research | Google *New York City, NY* June 2017 – Aug. 2017

- Designed a special autoencoder for high-dimensional sparse data.
- Benchmarked on public and internal datasets; contributed this algorithm to the TensorFlow codebase.
- Filed a patent application for the designed autoencoder.

Applied Scientist Intern | Amazon *East Palo Alto, CA* Jan. 2017 – Apr. 2017

- Designed a joint learning algorithm for Named Entity Recognition and Neural Machine Translation.
- Implemented this algorithm using MXNet.
- Conducted experiments in AWS on public datasets.

Research Experience

Structural Learning of Graphical Models Feb. 2018 – current

- Proved that logistic regression can recover the graph of arbitrary discrete pairwise graphical models.
- Derived a sample complexity which improves the state-of-the-art results.

Sparse Recovery Autoencoder June 2017 – Jan. 2018

- Designed a new autoencoder to learn linear embedding matrix for high-dimensional structured sparse data.
- Conducted experiments to demonstrate the superiority of the proposed method in learning compressed representation.

Multiplicative Gradient Tree Boosting Mar. 2017 – June 2017

- Designed a new forward stagewise non-additive algorithm for tree boosting.
- Implemented the proposed algorithm via customized loss of XGBoost and conducted experiments on real data.

Rescaled Johnson–Lindenstrauss Aug. 2016 – Dec. 2016

- Designed a new data-oblivious dimensionality reduction algorithm which outperforms the standard JL lemma.
- Derived theoretical guarantee for pairwise Euclidean distances and dot product similarity.

Single Pass PCA of Matrix Products Feb. 2015 – May 2016

- Designed a one-pass algorithm that can directly produce a low rank approximation of matrix products.
- Implemented in Apache Spark; conducted experiments in AWS using 150GB dataset.

Collaborative Ranking from Pairwise Comparisons Sept. 2014 – Dec. 2014

- Implemented a new collaborative ranking algorithm AltSVM which takes only pairwise comparisons as training data.
- Compared the statistical performance of AltSVM and Factorization Machines on real-world datasets.

Publications

- Sparse Logistic Regression Learns All Discrete Pairwise Graphical Models
  Shanshan Wu, Sujay Sanghavi, and Alexandros G. Dimakis
  Preprint, arXiv:1810.11905, NIPS workshop on Relational Representation Learning, 2018.
- The Sparse Recovery Autoencoder
  Shanshan Wu, Alexandros G. Dimakis, Sujay Sanghavi, Felix Y. Xu, Daniel Holtmann-Rice, Dmitry Storcheous, Afshin Rostamizadeh, and Sanjiv Kumar
  Preprint, arXiv:1806.10175
- Single Pass PCA of Matrix Products
  Shanshan Wu, Srinadh Bhojanapalli, Sujay Sanghavi, and Alexandros G. Dimakis
  Advances in Neural Information Processing Systems (***NIPS***) *2016*
- Leveraging Sparsity for Efficient Submodular Data Summarization
  Erik M. Lindgren, **Shanshan Wu**, and Alexandros G. Dimakis
  Advances in Neural Information Processing Systems (***NIPS***) *2016.*
- Sparse and Greedy: Sparsifying Submodular Facility Location Problems
  Erik M. Lindgren, **Shanshan Wu**, and Alexandros G. Dimakis
  NIPS workshop Optimization for Machine Learning (***NIPS OPT***) *2015*.
- Performance study on a CSMA/CA-Based MAC protocol for multi-user MIMO Wireless LANs
  Shanshan Wu, Wenguang Mao, and Xudong Wang
  IEEE Transactions on Wireless Communications (***TWC***), 2014.
- Distributed Opportunistic Scheduling with QoS Constraints for Wireless Networks with Hybrid Links
  Wenguang Mao, Xudong Wang, and **Shanshan Wu**
  IEEE Transactions on Vehicular Technology (***TVT***), 2015.

Teaching Experiences

- Teaching Assistant, EE381V (Machine Learning for Large Scale Data), UT-Austin, Spring 2016.
- Teaching Assistant, EE313 (Linear Systems and Signals), UT-Austin, Fall 2014.

Selected Honors and Awards

- Top 30% Reviewer for NIPS 2018.
- Excellent Graduate Student Scholarship (top 3%), Shanghai Jiao Tong University, 2013.
- National Scholarship (top 3%), Ministry of Education of China, 2007 / 2008 / 2009.
- First Prize, National High School Physics Competition, Jiangsu Province, China, 2006.
- Second Prize, National High School Mathematics Competition, Jiangsu Province, China, 2006.

Professional Activities

- Journal Reviewer: Journal on Machine Learning Research, IEEE Trans. on Mobile Computing / Vehicular Technology
- Conference Reviewer: NIPS 2016 / 2017 / 2018, ICML 2018

Graduate Courses at UT-Austin

- Large-Scale Optimization
- Probability and Stochastic Processes
- Information Theory
- Advanced Probability in Learning, Inference, and Networks
- Estimation Theory
- Data Mining
- Algorithms: Techniques/Theory
- Advanced Algorithms
- Sublinear Algorithms
- Topics in Learning Theory (audit)

Programming Skills

- Languages: Python, Matlab, Scala
- Data-processing libraries: Apache Spark MLlib, GraphX, scikit-learn, XGBoost, MXNet, TensorFlow, PyTorch, Gurobi