Praneeth Narayanamurthy

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Education

Ph.D., Electrical Engineering, Iowa State University, 2016 – 2021 (expected).
Thesis: *Provable and Efficient Algorithms for Robust Subspace Learning and Tracking.*

B.Tech., Electrical and Electronics Engineering, National Institute of Technology Karnataka, 2014.
Thesis: *Estimation of Lightning Parameters using Genetic Algorithms.*

Research Interests

Machine Learning, Signal Processing, Matrix Factorization, Time-Series Analysis, Optimization

Work Experience

Research Intern: May 2019 – Aug. 2019, *Stanford Research Institute (SRI International), Princeton*
I worked on analysis of satellite time-series data using Gaussian Process regression. I designed a domain-dependent graph-based kernel to perform joint spatio-temporal forecasting from extremely sparse and irregularly sampled data. We observed that this approach out performs Recurrent Neural Network, and Neural ODE based methods.

Research Assistant: Jan. 2016 – Present, *Iowa State University, Ames.*
I design and analyze provable, online algorithms for matrix factorization problems. Specifically, I have worked on Robust Principal Component Analsyis (RPCA), Matrix Completion (MC) and Robust Matrix Completion (RMC) algorithms. In our work we show that by exploiting mild statistical properties of time-series data, we are able to (i) obtain increased "robustness" for RPCA, (ii) complete matrices whose set of missing entries are not probabilistic in nature for MC, and (iii) provide the first provably online algorithm for RMC. I am currently working on structured Phase Retrieval, Neural Network compression, and Federated Learning.

Project Assistant: July 2014 – Dec. 2015, *Indian Institute of Science, Bangalore.*
I was part of the Indian Government project of developing Text-to-Speech systems for 11 regional Indian Languages. Specifically, I worked on (i) developing post-processing algorithms to enhance the naturalness of synthesized speech; and (ii) studying resampling techniques to reduce time and space complexity for low-footprint devices.

Publications

Google Scholar Metrics (July 2020): Citations – 269, h-index – 8, i10-index – 7

Pre-Prints

1. **Praneeth Naryanamurthy**, *Namrata Vaswani, and Aditya Ramamoorty*, [Federated Over-the-Air Subspace Learning from Incomplete Data](#), `manuscript` (Feb. 2020).

2. *Namrata Vaswani,* Praneeth Narayanamurthy, Fast Robust Subspace Tracking via PCA in Sparse Data-Dependent Noise, `manuscript` (June 2020).

Journals and Selected Conference Papers

1. Seyedehsara Nayer, **Praneeth Narayanamurthy**, and Namrata Vaswani, *Provable Low-Rank Phase Retrieval and Compressive PCA*, `IEEE Transactions on Information Theory` (Feb. 2020)

2. **Praneeth Narayanamurthy**, Vahid Daneshpajooh and Namrata Vaswani, *Provable Subspace Tracking from Missing Data and Matrix Completion*, `IEEE Transactions on Signal Processing` (May. 2019)

3. Seyedehsara Nayer, **Praneeth Narayanamurthy**, and Namrata Vaswani, *Phaseless PCA: Phaseless Low Rank Matrix Recovery from Column-wise Phaseless Measurements*, `International Conference on Machine Learning (ICML)` 2019, (Acceptance Rate 22.6%).

4. **Praneeth Naryanamurthy** and Namrata Vaswani, *Nearly Optimal Robust Subspace Tracking*, `International Conference on Machine Learning (ICML)`, Long talk (Top 8.6% of papers) 2018.

5. **Praneeth Narayanamurthy** and Namrata Vaswani, *Provable Dynamic Robust PCA or Robust Subspace Tracking*, `IEEE Transactions on Information Theory` (March 2019).

6. Namrata Vaswani, Thierry Bouwmans, Sajid Javed and **Praneeth Narayanamurthy**, *Robust PCA, Subspace Learning, and Tracking*, `IEEE Signal Processing Magazine` (July 2018).

7. Namrata Vaswani, and **Praneeth Narayanamurthy**, *Static and Dynamic Robust PCA and Matrix Completion: A review*, `Proceedings of IEEE` (Aug. 2018).

Conference and Workshops

1. **Praneeth Narayanamurthy**, Vahid Daneshpajooh, and Namrata Vaswani, *Provable Subspace Tracking with Missing Entries*, `IEEE International Symposium on Information Theory (ISIT)`, 2019.

2. **Praneeth Narayanamurthy**, Vahid Daneshpajooh, and Namrata Vaswani, *Provable Memory-Efficient Online Robust Matrix Completion*, `IEEE International Conference on Acousitcs Speech and Signal Processing (ICASSP)`, 2019

3. **Praneeth Narayanamurthy** and Namrata Vaswani, *Provable Dynamic Robust PCA or Robust Subspace Tracking*, `IEEE International Symposium on Information Theory (ISIT)`, 2018.

4. **Praneeth Narayanamurthy** and Namrata Vaswani, *Nearly Optimal Robust Subspace Tracking: A Unified Approach*, `IEEE Data Science Workshop (DSW)`, 2018.

5. Namrata Vaswani and **Praneeth Narayanamurthy**, *PCA in Sparse Data-Dependent Noise*, `IEEE International Symposium on Information Theory (ISIT)`, 2018.

6. **Praneeth Narayanamurthy** and Namrata Vaswani, *A Fast and Memory-Efficient Algorithm for Robust PCA (MERoP)*, `IEEE International Conference on Acousitcs Speech and Signal Processing (ICASSP)`, 2018

7. *Sajid Javed,* **Praneeth Narayanamurthy**, *Namrata Vaswani and Thierry Bouwmans*, *Robust PCA and Robust Subspace Tracking: A comparative Evaluation*, `IEEE Statistical Signal Processing Workshop (SSP)`, 2018.

8. *Namrata Vaswani and* **Praneeth Narayanamurthy**, *Finite Sample Guarantees for PCA in non-isotropic and Data-Dependent Noise*, `Allerton Conference on Communication, Control, and Computing`, 2017

9. *Brian Lois, Namrata Vaswani and* **Praneeth Narayanamurthy**, *Provably correct Robust Subspace Tracking: A Correlated-PCA-based Approach*, `NIPS workshop on LHDS`, 2016.

10. Gutta Sreedevi, **Praneeth Narayanamurthy**, and Chandra Sekhar Seelamantula, *Efficient Resampling of speech signals in Shift-Invariant Spaces*, `IEEE National Conference on Communications (NCC)` 2016.

11. **Praneeth Narayanamurthy** and Chandra Sekhar Seelamantula, *Dictionary-Learning based Post-Filter for HMM-based Speech Synthesis*, `IEEE Region 10 Conference (TENCON)` 2015.

Honors and Awards

Research Excellence Award, Iowa State University – 2019.

Finalist of Best Student Paper Award, SPARS-2019.

Recepient of ICML travel grant – 2018, 2019.

Finalist of (Indian) National GE Edison Challenge – 2013.

Indian National Mathematical Olympiad Awardee – 2009.

Professional Service

I review articles for IEEE Transactions on Signal Processing, IEEE Transactions on Image Processing, IEEE Transactions on Networking, IEEE Journal of Selected Topics in Signal Processing, IEEE Signal Processing and Wireless Communications, ICML (2020), NeurIPS (2020), ...

Graduate Courses

Electrical Engineering: Probability and Random Processes, Convex Optimization, Detection and Estimation Theory, Principles of Data Science, Deep Machine Learning, Statistical Machine Learning

Computer Science: Design and Analysis of Algorithms, Machine Learning

Mathematics: Linear Algebra, Real Analysis, Numerical Analysis-II

Skills

Proficient: MATLAB, LaTeX

Intermediate: Python (Tensorflow, Keras, PyTorch), C++, Git

Beginner: Julia, Scheme, Perl, Bash

Talks

1. *Nearly Optimal Robust Subspace Tracking*
   Dept. Mathematics (Probability, Analysis, and Data Science Seminar), Iowa State University, Ames
   April 2019

2. *MEDRoP: Memory Efficient Dynamic Robust PCA*
   Microsoft Research India, Bangalore
   ECE Department, Indian Institute of Science, Bangalore
   December 2017

Last updated: July 16, 2020