

Sirisha Rambhatla

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Experience

Dept. of Electrical and Computer Eng., University of Minnesota **Minneapolis, MN**
Research Assistant, Advisor: Prof. Jarvis Haupt, Ph.D 2014–present, 2011–12
Analyze and study problems in the area of statistical signal processing and machine learning.

Robins Kaplan L.L.P. **Minneapolis, MN**
Science Advisor March 2013– July 2014
Assist attorneys in strategizing for various technical issues involved in technology licensing and Intellectual Property (IP) litigation.

Ativa Medical Inc. **St. Paul, MN**
Engineering Intern (R&D) Jun–Oct 2012 and Jun–Aug 2011
Develop signal and data processing algorithms for analysis of flow-cytometric time series data with applications to blood diagnostics.

Education

University of Minnesota-Twin Cities **Minneapolis, MN**
Ph.D. Student (Electrical Engineering), 3.8 Sep 2014–present
Relevant Coursework: Tensor Decompositions, Machine Learning, Adaptive Digital Signal Processing, Optimization Theory, Detection and Estimation, Collaborative and Social Computing
Awards/Honors: E. Bruce Lee Memorial Fellowship for Academic Year 2014-15.
National Science Foundation (NSF) Travel Award, GlobalSIP 2016.
Finalist, Student Best Paper Award, Asilomar 2017.

University of Minnesota-Twin Cities **Minneapolis, MN**
M.S. Electrical Engineering, 3.7 Dec 2012
Relevant Coursework: Introduction to Nonlinear Optimization, Multirate and Multiscale Signal Processing, Image Processing and Applications, Robust Control System Design, Robotics, Linear Systems and Optimal Control, Probability and Stochastic Processes.
Awards/Honors: SciTechsperience Internship, Minnesota High Tech Association (MHTA), 2012.

College of Engineering Roorkee **Roorkee, India**
B.Tech (Hons.), Electronics and Telecommunication Engineering, 81.4% May 2010
Awards/Honors: Placed third in the merit list, 2010.
Academic Excellence Award for session 2006-07 and 2009-10.

Master's Thesis

Semi-Blind Source Separation via Sparse Approximation and Online Dictionary Learning
Advisor: Prof. Jarvis Haupt Ph.D.

Description: Analyze the single channel semi-blind source separation problem with applications to electro-shock law enforcement devices, image and video data analysis. [1]

Research Projects

Exact Decomposition of a 3-way Structured Tensor via Dictionary Learning

Problem: Develop a provable algorithm for exact tensor decomposition via a graph clustering based dictionary learning technique. Here, two factors of the tensor factors are sparse, while the third follows some incoherence conditions. We pose the recovery of incoherent factor as a dictionary learning problem, and employ a stochastic proximal gradient algorithm to recover the sparse factors for this large scale optimization algorithm [2].

Applications: User and community analytics.

Dictionary-based Generalization of Robust PCA

Problem: Analyze a dictionary-based generalization of Robust PCA. Here, the data matrix is assumed to be formed via a superposition of a low-rank part and a component which is sparse is an *a priori* known dictionary. We develop a dual certificate based analysis to derive the conditions under which solving a convex optimization problem will recover the unknown components exactly [3][4].

Applications: Target detection in hyperspectral images [5], text mining, anomaly detection, and other information segmentation applications.

Provable Matrix Completion Under Sparse Factor Model

Problem: Develop a provable algorithm for potential high-rank matrix completion problem, where the matrix of interest admits a sparse factor decomposition [6].

Applications: High-rank structured matrix completion tasks.

Skills

Scientific Computing: MATLAB/Simulink and Mathematica.

Programming Languages: C (Intermediate), C++(Intermediate), and Python(Intermediate).

Embedded programming: dsPIC, ATMEGA16/32, MPLAB, and Eclipse IDE.

Relevant Course Projects

TensorMap: Lidar based Topological Map and Localization via Tensor Decompositions

Tensor Decompositions Course Project

May 2016

Develop a Tucker-3 decomposition based technique to learn topological maps for LIDAR data which compresses the map about 8300 times as compared to the full LIDAR scan.

Error in Variables Model for Calibration of Echo Planar Imaging (MRI)

Optimization Theory Course Project

May 2015

Develop a technique to counter the calibration problem encountered in echo planar imaging by using the errors in variables model, posing the problem as an elastic net.

Technical Service

- Reviewer, International Conference on Artificial Intelligence and Statistics (AISTATS) 2018
- Reviewer, Signal Processing Letters (SPL), 2017
- Reviewer, SIAM Journal of Imaging Sciences, 2017
- Reviewer, IEEE Transactions on Industrial Informatics (T-II) 2017
- Reviewer, IEEE Transactions on Signal Processing (T-SP) 2016
- Reviewer, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2016
- Reviewer, International Conference on Artificial Intelligence and Statistics (AISTATS) 2016
- Reviewer, IEEE Transactions on Signal Processing (T-SP) 2015
- Reviewer, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2015
- Reviewer, IEEE Transactions on Signal Processing (T-SP) 2014

Talks

- "Provably Recovering Patterns from Data: Matrix to Tensors", Yahoo! Research, November 2017.

Publications

- [1] S. Rambhatla and J. Haupt. Semi-Blind Source Separation via Sparse Representations and Online Dictionary Learning. In *Proceedings of the 47th Asilomar Conference on Signals Systems and Computers*, 2013.
- [2] S. Rambhatla, D. Xiao, J. Haupt, and N. Sidiropoulos. Exact recovery of multiple sparse CPD/PARAFAC factors of a tensor via dictionary learning. In *Asilomar Conference on Signals Systems and Computers*, 2017.
- [3] S. Rambhatla, X. Li, and J. Haupt. A dictionary based generalization of robust PCA. In *2016 IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, pages 1315–1319, Dec 2016.
- [4] S. Rambhatla, X. Li, and J. Haupt. A dictionary based generalization of robust pca with applications. *Journal in preparation*, 2017.
- [5] S. Rambhatla, X. Li, and J. Haupt. Target-based hyperspectral demixing via generalized robust PCA. In *Asilomar Conference on Signals Systems and Computers*, 2017.
- [6] S. Rambhatla and J. Haupt. Provable matrix completion under sparse factor model. *In preparation*, 2017.