

Sirisha Rambhatla

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PROFESSIONAL SUMMARY Analytical and detail oriented electrical engineer working at the cusp of machine learning, statistical signal processing, and optimization. Passionate about developing scalable algorithms with theoretical performance guarantees to extract patterns from data in order to solve high-impact real-world problems. Adept at analyzing and developing models and algorithms for various learning tasks, and at prototyping them.

EDUCATION **Doctor of Philosophy (Ph.D.)** in Electrical Engineering Aug. 2014 - May 2019 (*expected*)
University of Minnesota–Twin Cities (3.8)
Thesis Topic: Provable Algorithms for Matrix Decompositions & Factorization
Focus Area: Machine Learning, Statistical Signal Processing, Convex and Non-Convex Optimization.

Master of Science (M.S.) in Electrical Engineering Aug. 2010 - Dec. 2012
University of Minnesota–Twin Cities (3.7)
Thesis: Semi-Blind Source Separation via Sparse Approximation & Online Dictionary Learning

Bachelor of Technology (B.Tech) in Electronics & Telecom. Engineering Aug. 2006 - May 2010
College of Engineering Roorkee (COER), India (81.4% (Honors)) (*Bronze Medalist*)

SKILLS Scientific Computing: MATLAB/Simulink, Mathematica
Programming Languages: Python (SciPy, scikit-learn, Natural Language Toolkit (NLTK), pandas), C , C++
Deep Learning Tools: TensorFlow
Other skills: Proficient with Linux/Unix Shell; Leveraging Supercomputing resources; Embedded systems programming; Exceptional written and verbal communication skills.

EXPERIENCE **Graduate Research Assistant** Feb. 2011 – May 2012 & Aug. 2014 – Present
Dept. of Electrical and Computer Engineering University of Minnesota–Twin Cities, Minneapolis, MN

Theoretical Focus:

- Analyzed 5 matrix/tensor factorization and demixing models for machine learning applications by posing them as semi-supervised and unsupervised learning tasks. Developed provable algorithms for these learning tasks using convex and non-convex formulations. Designed and implemented experiments to analyze the performance of these algorithms using high performance computing tools. Analyzed the algorithms theoretically using tools from statistical signal processing and optimization.
- Developed a fast, scalable, distributed algorithm with performance guarantees for recovering the factors of the dictionary learning (a matrix factor) model. Designed and implemented the algorithm as a neural network to be run on graphical processing unit (GPU)s via TensorFlow.
- Developed an algorithm for tensor factorization based on the dictionary learning technique.

Applications Focus:

- Identified applications (and analyzed performance) of the developed techniques on real-world applications. For instance, developed a technique for localizing targets based on their spectral signatures in hyperspectral images.
- Developed a technique to build maps from Lidar data using tensor decompositions for vehicle navigation.

Mentoring Activities:

- Currently mentoring undergraduate women with research interests in data science via the ExploreCSR program to give them insights into academic research. To this end, identified and designed a short-term research project with applications to financial portfolio management.
- Mentored our research group on
 - utilizing the supercomputing resources at the university in order to significantly speed-up various computational tasks;

- identifying patentable technologies and filing for appropriate legal protections to maximize the technical contributions.

Science Advisor

Intellectual Property (IP) and Technology Litigation

Mar. 2013 – Jun. 2014

Robins Kaplan LLP, Minneapolis, MN

- Strategized for various technical issues involved in technology licensing and IP litigation. Analyzed potential IP cases to evaluate their validity and scope. Performed infringement analysis, including source code inspection (Android, iOS, JAVA, C++, C and Objective-C code).
- Designed experiments to identify infringement. In a particular instance, developed an experiment on-the-fly in a client facing meeting to save upwards of \$100,000 in chip tear-down costs (and time) to prove infringement.

Engineering Intern (R&D)

Technology and Engineering Division

Jun.– Aug. 2011 & Jun.– Oct. 2012

Ativa Medical Inc., St. Paul, MN

- Developed signal & data analysis algorithms for instrumentation of flow-cytometry-based product.
- Collaborated with the team to develop an imaging based blood diagnostics product. Designed a wavelet based focus-stacking algorithm to improve quality of images to enable identification of blood cells.

Undergraduate Research Intern

Networked Control Systems Lab

May 2009 – Jul. 2009

Indian Institute of Technology Kanpur (IITK), Kanpur, India

- Developed a networked embedded test-bed for an all-wheel drive and steer prototype lunar rover.
- Designed, test and document the distributed control algorithms on the test-bed for control of D.C. motors to facilitate its use for an undergraduate course at the institute

SELECTED PUBLICATIONS

- [1] **S. Rambhatla**, N. D. Sidiropoulos and J. Haupt. TENSORMAP: Lidar-based Topological Mapping and Localization via Tensor Decompositions, *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2018.
- [2] **S. Rambhatla**, X. Li, and J. Haupt. Target Based Hyperspectral Demixing via Generalized Robust PCA. *Asilomar Conference on Signals, Systems, and Computers (Asilomar)*, 2017. **Student Best Paper Award Finalist**
- [3] **S. Rambhatla**, X. Li, and J. Haupt. A Dictionary Based Generalization of Robust PCA. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2016. **National Science Foundation (NSF) Travel Award**
- [4] **S. Rambhatla** and J. Haupt. Semi-Blind Source Separation via Sparse Representations and Online Dictionary Learning. *Asilomar Conference on Signals, Systems, and Computers (Asilomar)*, 2013.

SELECTED TALKS

- “Provably Recovering Patterns from Data: Matrix to Tensors.” Nov. 2017
— Yahoo! Research, San Jose, CA.
- “Dictionary based Generalization of Robust PCA.” Dec. 2016
— GlobalSIP 2016, Washington D.C.

SELECTED AWARDS AND HONORS

E. Bruce Lee Memorial Fellowship, University of Minnesota–Twin Cities Fall 2014 – Spring 2015
SciTechsperience Fellowship, Minnesota High Tech Association (MHTA) Jul. 2012
Academic Excellence Award, COER, India Sessions 2009 – 10 & 2006 – 07

SELECTED COURSEWORK

Machine Learning, Probability and Stochastic Processes, Optimization Theory, Tensor Decompositions, Detection and Estimation, Collaborative and Social Computing, Nonlinear Optimization, Image Processing and Applications, Linear Systems and Optimal Control.

PROFESSIONAL MEMBERSHIPS

Collegiate Member, Society of Women Engineers (SWE), since 2018
Student Member, IEEE Signal Processing Society (SPS), since 2018
Student Member, IEEE, since 2013
Member, Eta Kappa Nu (HKN), since 2011