Sirisha Rambhatla

Contact Information

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Research Focus

Statistical Machine Learning, Design of Provable Learning Algorithms, Sparse Signal Processing, Optimization, Interpretability of Deep Learning Models, AI for Healthcare, Spatiotemporal Data Analysis.

Education

Doctor of Philosophy (Ph.D.) in Electrical Engineering — Sep. 2014 - Sep. 2019
University of Minnesota – Twin Cities (3.8) — Minneapolis, MN
Thesis: *Provably Learning from Data: New Algorithms for Matrix/Tensor Decompositions & Factorizations*
Advisor: Prof. Jarvis Haupt
Committee Members: Prof. Georgios B. Giannakis, Prof. Nikos Papanikolopoulos, Prof. Mingyi Hong

Master of Science (M.S.) in Electrical Engineering — Aug. 2010 - Dec. 2012
University of Minnesota – Twin Cities (3.7) — Minneapolis, MN
Thesis: *Semi-Blind Source Separation via Sparse Approximation & Online Dictionary Learning*
Advisor: Prof. Jarvis Haupt
Committee Members: Prof. Zhi-Quan Luo, Prof. Arindam Banerjee

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

Experience

Postdoctoral Scholar – Research Associate — Oct. 2019 – Present
Computer Science Department — Los Angeles, CA, USA
University of Southern California
Mentor: Prof. Yan Liu

Graduate Research Assistant — Aug. 2014 – Sept. 2019
Department of Electrical and Computer Engineering — Minneapolis, MN
University of Minnesota – Twin Cities

Explore Computer Science Research (ExplorCSR) Mentor — Oct. 2018 – Feb. 2019
Volunteer Group Leader — Minneapolis, MN
Google Research

Science Advisor — Mar. 2013 – Jun. 2014
Intellectual Property (IP) and Technology Litigation — Minneapolis, MN
Robins Kaplan LLP

Engineering Intern (R&D) — Jun.– Aug. 2011 & Jun.– Oct. 2012
Technology and Engineering Division — St. Paul, MN
Ativa Medical Inc.

Graduate Research Assistant — Feb. 2011 – May 2011 & Aug. 2011 – May 2012
Department of Electrical and Computer Engineering — Minneapolis, MN
University of Minnesota – Twin Cities

Undergraduate Research Intern — May 2009 – Jul. 2009
Networked Control Systems Lab — Kanpur, India
Indian Institute of Technology Kanpur (IIT-K)

Awards and Honors

ICLR Travel Award, *International Conference on Learning Representations (ICLR)*, 2019
Selected Presenter, "Graduation Day" Session, *Information Theory & Applications Workshop*, 2019
Finalist, Student Best Paper Award, *Asilomar Conference on Signals, Systems & Computers*, 2017
National Science Foundation (NSF) Travel Award, *GlobalSIP*, 2016
E. Bruce Lee Memorial Fellowship, *University of Minnesota – Twin Cities*, 2014
SciTechsperience Fellowship, *Minnesota High Tech Association*, 2012
University Merit List, Third Place – ECE (Bronze Medal), *Uttarakhand Technical University, India*, 2010
Proficiency Award for Academic Excellence, *COER, India*, Academic Year 2009 – 10
Proficiency Award for Academic Excellence, *COER, India*, Academic Year 2006 – 07

Publications

[1] N. Kamra, Y. Zhang, **S. Rambhatla**, C. Meng, Y. Liu. PolSIRD: Modeling Epidemic Spread under Intervention Policies and an Application to the Spread of COVID-19. (*Accepted to Journal of Healthcare Informatics Research*), 2021. [Link]

[2] L. Trinh, M. Tsang, **S. Rambhatla**, Y. Liu. Interpretable and Trustworthy Deepfake Detection via Dynamic Prototypes. IEEE Winter Conference on Applications of Computer Vision (WACV), 2021. [Link]

[3] **S. Rambhatla**, X. Li, and J. Haupt. Provable Online CP/PARAFAC Decomposition of a Structured Tensor via Dictionary Learning. *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. [Link]

[4] M. Tsang, **S. Rambhatla**, Y. Liu. How does this interaction affect me? Interpretable attribution for feature interactions. *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. [Link]

[5] S. Seo*, C. Meng*, **S. Rambhatla**, Y. Liu. Physics-aware Spatiotemporal Modules with Auxiliary Tasks for Meta-Learning. *Neural Information Processing Systems (NeurIPS) Workshop on Machine Learning and the Physical Sciences*, 2020. [Link]

[6] **S. Rambhatla**, X. Li, J. Ren and J. Haupt. A Dictionary-Based Generalization of Robust PCA With Applications to Target Localization in Hyperspectral Imaging. *IEEE Transactions on Signal Processing*, vol. 68, pp. 1760 – 1775, 2020. [Link]

[7] **S. Rambhatla**, X. Li, and J. Haupt. NOODL: Provable Online Learning for Dictionary Learning and Sparse Coding. *International Conference on Learning Representations (ICLR)*, 2019. **Travel Award**. [Link]

[8] **S. Rambhatla**, N. Sidiropoulos, and J. Haupt. TensorMap: Lidar-based Topological Mapping and Localization via Tensor Decompositions. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2018. [Link]

[9] X. Li, J. Ren, **S. Rambhatla**, Y. Xu, and J. Haupt. Robust PCA via Dictionary Based Outlier Pursuit. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018. [Link]

[10] **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**. [Link]

[11] **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**. [Link]

[12] **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. [Link]

Under Review

[13] Nan Xu*, Loc Trinh*, **Sirisha Rambhatla**, Samuel Assefa, Jiahao Chen, Zhen Zeng, and Yan Liu. Simulating continuous-time human mobility trajectories. *Deep Learning for Simulation Workshop, International Conference on Learning Representations (ICLR)*, 2021.

[14] S. Huang*, **S. Rambhatla***, L. Trinh, M. Zhang, M. Dong, V. Unadkat, H. A. Yenikomshian, J. Gillenwater, and Y. Liu. `DL4Burn`: Burn surgical candidacy using multimodal deep learning. (*Manuscript Under Review*), 2021.

[15] S. Huang*, **S. Rambhatla***, Loc Trinh, M. Zhang, M. Dong, V. Unadkat, J. Lin, M. K. Sheth, J. Dang, H. A. Yenikomshian, Y. Liu, and J. Gillenwater. Predicting burn surgical candidacy using deep learning on photographic images. (*Abs. Under Review*), 2021.

[16] A. J. Hung, **S. Rambhatla**, D. I. Sanford, N. Pachauri, E. Vanstrum, J. H. Nguyen, Y. Liu. Automating Robotic Suturing Skills Assessment: Battling Mislabeling & Label Uncertainty. (*Abs. Under Review*), 2021.

[17] A. J. Hung, **S. Rambhatla**, N. Pachauri, D. I. Sanford, J. H. Nguyen, Y. Liu. Automating suturing skills assessment with a limited surgeon dataset: Meta learning. (*Abs. Under Review*), 2021.

[18] **S. Rambhatla**, Z. Che, Y. Liu. I-SEA: Importance Sampling and Expected Alignment-based Distance Metric Learning for Time Series. (*Under Review*), 2021.

[19] **S. Rambhatla***, S. Zeighami*, K. Shahabi, C. Shahabi, and Y. Liu. Towards Accurate Spatiotemporal COVID-19 Risk Scores using High Resolution Real-World Mobility Data. (*Under Review*), 2020. [Link]

[20] C. Meng, **S. Rambhatla**, Y. Liu. Cross-Node Federated Graph Neural Network for Spatio-Temporal Data Modeling. (*Under review*), 2020.

[21] K. Sharma, S. Seo, C. Meng, **S. Rambhatla**, Y. Liu. COVID-19 on Social Media: Analyzing Misinformation in Twitter Conversations. (*Under review*), 2020. [Link]

Preprints/reprints available on `arxiv` and at `https://sirisharambhatla.com/publications.html`. * Equal contribution.

Teaching Experience

- Instructor, CSCI 567 - Machine Learning — Spring 2021
  — *University of Southern California, Los Angeles, CA*
- Guest Lecturer, CSCI 699 - Advanced Topics in Deep Learning — Fall 2020
  — *University of Southern California, Los Angeles, CA*
- Guest Lecturer, EE 3025 - Statistical Methods in Electrical and Computer Engineering — Fall 2017
  — *University of Minnesota – Twin Cities, Minneapolis, MN*

Talks/ Posters

- "Provable Online CP/PARAFAC Decomposition via Dictionary Learning" — Dec. 2020
  — *Neural Information Processing Systems (NeurIPS), Virtual Conference.*
- "How does this interaction affect me? Interpretable attribution for feature interactions." — Dec. 2020
  — *Neural Information Processing Systems (NeurIPS), Virtual Conference.*
- "Provable Online Dictionary Learning and Sparse Coding" — Jun. 2019
  — *CyberOptics Corporation, Minneapolis, MN.*
- "NOODL: Provable Online Dictionary Learning and Sparse Coding" — May 2019
  — *International Conference on Learning Representations, New Orleans, LA.*
- "Provable Online Dictionary Learning and Sparse Coding" — May 2019
  — *Department of Electrical and Computer Engineering, Georgia Tech., Atlanta, GA.*
- "Provable Online Dictionary Learning and Sparse Coding" — Feb. 2019
  — *Information Theory and Applications (ITA) Workshop, San Diego, CA.*
- "Lidar-based Topological Mapping & Localization via Tensor Decompositions." — Nov. 2018
  — *GlobalSIP 2018, Anaheim, CA.*
- "Provable Online Dictionary Learning and Matrix Factorization" — Sept. 2018
  — *Digital Technology Center, Minneapolis, MN.*
- "Target-Based Hyper Spectral Demixing via Generalized Robust PCA." — Mar. 2018
  — ECE Seminar on Signal Processing, Information Theory, and Communication,
  University of Minnesota – Twin Cities, Minneapolis, MN.

- "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.*
- "Semi-Blind Source Separation via Sparse Approximation & Online Dictionary Learning."
  — *Asilomar Conference on Signals, Systems & Computers, Pacific Grove, CA.* Nov. 2013

Technical Service

- Workshop Co-chair, *International Conference on COMmunication Systems & NETworkS (COMSNETS)*
  — *Chancery Pavilion Hotel, Bangalore, India* Jan. 2022
- Organizer & Host, Computer Science Colloquium on "Algorithmic Fairness and the Law" Apr. 2021
  — *University of Southern California, Los Angeles, CA*
- Organizer, AI for COVID-19 in LA Virtual Symposium (attended by over 350 participants) 2020
  — *University of Southern California, Los Angeles, CA*
- Ambassador, Women in Data Science (WiDS) 2020
  — *University of Southern California, Los Angeles, CA*
- Organizer, "Patent basics for Engineers and Researchers" 2019
  — *Digital Technology Center, University of Minnesota–Twin Cities, Minneapolis, MN*
- Session Co-Chair, Reinforcement Learning, and High-dimensional Statistics 2019
  — *Information Theory and Applications (ITA) Workshop 2019, San Diego, CA*
- Session Chair, Deep Learning-based Signal Processing for Wireless Communication 2018
  — *GlobalSIP 2018, Anaheim, CA*
- Program Committee, Association for the Advancement of Artificial Intelligence (AAAI) 2020
- Reviewer, Neural Information Processing Systems (NeurIPS) 2020
- Reviewer, International Conference on Machine Learning (ICML) 2021, 2020
- Reviewer, Journal of Selected Topics in Signal Processing (JSTSP) 2020
- Reviewer, IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI) 2021, 2020
- Reviewer, ACM Transactions on Computing for Healthcare 2021, 2020
- Reviewer, International Conference on Artificial Intelligence & Statistics (AISTATS) 2018, 2016
- Reviewer, International Conference on Acoustics, Speech & Signal Processing (ICASSP) 2016, 2015
- Reviewer, Transactions on Signal Processing (T-SP) 2021, 2020, 2019, 2018, 2016, 2015, 2014
- Reviewer, Signal Processing Letters (SPL) 2017
- Reviewer, SIAM Journal of Imaging Sciences 2017
- Reviewer, Transactions on Industrial Informatics (T-II) 2017

Workshops

- "Frontiers in Machine Learning" 2020
  — *Microsoft Research*
- "IEEE Data Science Workshop (DSW)" 2019
  — *University of Minnesota Twin-Cities, Minneapolis, MN*
- "Information Theory & Applications Workshop (ITA)" 2019
  — *San Diego, CA*
- "Resource Trade-offs: Computation, Communication, and Information" 2016
  — *Institute of Mathematics and its Applications (IMA), Minneapolis, MN*
- "Sparsity and Computation" 2011
  — *Institute for Advanced Study, Princeton, NJ*

Software Packages

`TensorNOODL`: Provable Online CP/PARAFAC Decomposition via Dictionary Learning (MATLAB).

`NOODL`: Provable Online Learning Algorithm for Dictionary Learning and Sparse Coding.
- Distributed implementations via MATLAB and TensorFlow.

D-RPCA: Dictionary-Based Generalization of Robust PCA. (MATLAB)
- Analysis of Theoretical Properties, and Target Localization in Hyperspectral Images.

TensorMap: Lidar-based Mapping and Localization via Tensor Decompositions. (MATLAB)

Skills

Scientific Computing:	MATLAB/Simulink and Mathematica.
Programming Languages:	Python (scikit-learn, statsmodels, pandas, etc.), C, and C++.
Deep Learning:	TensorFlow, PyTorch.
Embedded Programming:	dsPIC, ATMEGA16/32, and MPLAB.
Other skills:	Linux/Unix Shell, Supercomputing, and Version control.

Relevant Coursework

Tensor Decompositions, Machine Learning, Probability and Stochastic Processes, Adaptive Digital Signal Processing, Optimization Theory, Detection and Estimation, Collaborative and Social Computing, Introduction to Nonlinear Optimization, Multirate and Multiscale Signal Processing, Image Processing and Applications, and 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