Sirisha Rambhatla

Contact Information

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Waterloo, ON, Canada

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Research Focus

Statistical Machine Learning, Spatiotemporal Data Analysis, AI for Surgery and Healthcare, Sparse Signal Processing, Interpretability of Deep Learning Models.

Education

Doctor of Philosophy (Ph.D.) in Electrical Engineering — Sep. 2014 - Sep. 2019
University of Minnesota – Twin Cities — 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 — 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) Honors in Electronics & Telecom. Eng. — Aug. 2006 - May 2010
College of Engineering Roorkee (COER) — Roorkee, India
University Bronze Medalist

Experience

Tenure-Track Assistant Professor — July. 2021 – Present
Management Sciences Department, Faculty of Engineering — Waterloo, ON, Canada
Faculty Affiliate, Waterloo AI Institute
University of Waterloo

Postdoctoral Scholar – Research Associate — Oct. 2019 – July, 2021
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, USA
University of Minnesota – Twin Cities

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

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

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

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

Outstanding Paper Presentation Award, *Plastic Surgery: the Meeting* 2021
Merit Award for Excellence in Postdoctoral Research, *WiSE, University of Southern California* 2020 – 21
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 – 2015
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* 2009 – 10
Proficiency Award for Academic Excellence, *COER, India* 2006 – 07

Publications

[1] **S. Rambhatla**, Z. Che, and Y. Liu. I-SEA: Importance Sampling and Expected Alignment-based Deep Distance Metric Learning for Time Series Analysis and Embedding. *36th Association for the Advancement of Artificial Intelligence (AAAI) conference on Artificial Intelligence*, 2022.

[2] A. B. Chen, T. Haque, S. Roberts, **S. Rambhatla**, G. Cacciamani, P. Dasgupta, A. J. Hung. Artificial Intelligence Applications in Urology: Reporting Standards to Achieve Fluency for Urologists. *Urology Clinics North America*, 2022.

[3] **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. ACM Transactions on Spatial Algorithms and Systems (TSAS) , 2022. [Link]

[4] A. J. Hung, **S. Rambhatla**, D. I. Sanford, N. Pachauri, E. Vanstrum, J. H. Nguyen, and Y. Liu. Road to Automating Robotic Suturing Skills Assessment:Battling Mislabeling of the Ground Truth. *Surgery*, 2021.

[5] **S. Rambhatla***, S. Huang*, L. Trinh, M. Zhang, M. Dong, V. Unadkat, H. A. Yenikomshian, J. Gillenwater, and Y. Liu. `DL4Burn`: Burn surgical candidacy using multimodal deep learning. *American Medical Informatics Association (AMIA) Annual Symposium*, 2021.

[6] S. Huang*, **S. Rambhatla***, L. 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. *Plastic Surgery: the Meeting*, 2021. **Outstanding Paper Presentation Award**

[7] C. Meng, **S. Rambhatla**, and Y. Liu. Cross-Node Federated Graph Neural Network for Spatio-Temporal Data Modeling. *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)*, 2021.

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

[9] A. J. Hung, **S. Rambhatla**, N. Pachauri, D. I. Sanford, J. H. Nguyen, and Y. Liu. Automating suturing skills assessment with a limited surgeon dataset: Meta learning. *American Urology Association*, 2021. **Selected for Podium Talk**

[10] S. Seo*, C. Meng*, **S. Rambhatla**, and Y. Liu. Physics-aware Spatiotemporal Modules with Auxiliary Tasks for Meta-Learning. *International Joint Conferences on Artificial Intelligence (IJCAI)*, 2021. [Link]

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

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

[13] **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]

[14] **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]

[15] **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]

[16] **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]

[17] 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]

[18] **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]

[19] **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]

[20] **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]

Workshop Papers

[21] N. Xu*, L. Trinh*, **S. Rambhatla**, S. Assefa, J. Chen, Z. Zeng, and Y. Liu. Simulating continuous-time human mobility trajectories. *Deep Learning for Simulation Workshop, International Conference on Learning Representations (ICLR)*, 2021.

[22] 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]

Under Review

[23] N. Xu*, L. Trinh*, **S. Rambhatla**, S. Assefa, J. Chen, Z. Zeng, and Y. Liu. Transformer-based Spatiotemporal Dependencies Modeling for Synthetic Data Generation. (*Manuscript Under Review*), 2021.

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

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

Teaching Experience

- Instructor, CSCI 567 - Machine Learning (Class size: 85) Spring 2021
  — *University of Southern California, Los Angeles, CA*
- Guest Lecturer, CSCI 699 - Advanced Topics in Deep Learning (Class size: 40) Fall 2020
  — *University of Southern California, Los Angeles, CA*
- Guest Lecturer, EE 3025 - Statistical Methods in Elec. and Comp. Eng. (Class size: 150) Fall 2017
  — *University of Minnesota – Twin Cities, Minneapolis, MN*

Talks/ Posters

- "Theory Guided Machine Learning for the Real World" Dec. 2020
  — *Vision and Image Processing lab, Systems Design Engineering Department, University of Waterloo.*
- "Provable Online CP/PARAFAC Decomposition via Dictionary Learning" Dec. 2020
  — *Women in Theoretical Machine Learning Symposium, Virtual Symposium.*
- "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

- Senior Program and Mentorship Co-chair, *Women in Machine Learning Workshop* 2021 – 22
  — *Women in Machine Learning (WiML)*
- 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) 2022, 2021
- Reviewer, International Conference on Learning Representations (ICLR) 2021
- Reviewer, Neural Information Processing Systems (NeurIPS) 2021, 2020
- Reviewer, International Conference on Machine Learning (ICML) 2022, 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.

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