SUCHITA BHINGE

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EDUCATION

University of Maryland, Baltimore County *January 2016 — December 2019*
PhD in Electrical Engineering
Dissertation Topic: "Adaptive Constrained Independent Vector Analysis: Application to Large-Scale fMRI Analysis"
Advisor: Dr. Tülay Adalı
Overall GPA: 3.49

University of Maryland, Baltimore County *August 2013 — December 2015*
MS in Electrical Engineering
Thesis Topic: "Blind source separation for detection of abandoned objects: Exploiting different types of diversity"
Advisor: Dr. Tülay Adalı
Overall GPA: 3.27

PES Modern College of Engineering, University of Pune *August 2009 — May 2013*
BE in Electronics and Telecommunication Engineering

TECHNICAL SKILLS

Computer Languages	MATLAB, Python, Tensorflow, Keras, R, SQL, HTML
Software & Tools	LaTeX, H2O Driverless AI
Operating System	Windows, MAC OS, Linux

RESEARCH EXPERIENCE

Machine Learning for Signal Processing Laboratory January 2016 — Present
Research Assistant *Baltimore, MD*

- Built unsupervised machine learning models to extract meaningful features from large-scale functional magnetic resonance imaging (fMRI) data (acquired from 300+ individuals)
- Improved on existing algorithms to efficiently incorporate statistical properties of fMRI signals resulting in a performance gain of 14.71% (method included in Group ICA for fMRI toolbox)

Machine Learning for Signal Processing Laboratory January 2014 — December 2015
Graduate Student Researcher *Baltimore, MD*

- Designed a system to detect abandoned objects from multi-view videos sequences using matrix factorization techniques
- Presented the work in the form of a poster and talk at two conference venues

SELECTED PUBLICATIONS

Spatio-temporal dynamic functional connectivity analysis of fMRI data IEEE TMI 2019

- Developed a technique using adaptive constrained independent vector analysis to extract time-varying spatio-temporal patterns from fMRI data acquired from 91 healthy individuals and 88 patients with schizophrenia
- Performed statistical analysis on graph-theoretical metrics to identify abnormal patterns for patients with schizophrenia

· Discovered network states using k-means clustering and performed Markov analysis to study state transitions, probability of states and dwell times in states for each group

Abandoned object detection from multi-view video sequences ICASSP 2017

· Employed an independent vector analysis model to extract stationary objects by exploiting the temporal dependence structure from multi-view video sequences
· Identified abandoned objects using the temporal information and obtained improved detection through joint analysis of videos captured from multiple angles

Common subspace order selection (MCCA) CISS 2017

· Designed a novel technique using multiset canonical correlation analysis to estimate the number of common signals across multiset/multimodal datasets
· Achieved lowest root mean square error compared with existing methods on simulated datasets

RELEVANT PROJECTS

Pothole detection with CNN

· Implemented CNN based model for object detection that can automate pothole localization from images
· Extracted features using Resnet50 neural network and trained a pothole detector using YOLO v2 network architecture

Image classification

· Extracted SURF features using computer vision toolbox from images to generate bag-of-visual words for training a classifier
· Obtained highest classification accuracy using linear SVM compared with perceptron and Naïve Bayes

Breast cancer classification with deep learning

· Designed a artificial neural network using Tensorflow to predict benign and malignant breast cancer using 30 attributes of a cell nuclei
· Achieved 97% accuracy in terms of correctly classifying malignant and benign observations

Airbnb price prediction in Python

· Performed exploratory analysis to identify informative features from a set of variables
· Transformed categorical variables into numeric entries and multi-text variables using one-hot encoding
· Performed regression analysis to predict the price of Airbnb and identify variables affecting the price

JOURNAL PUBLICATIONS

S. Bhinge, R. Mowakeaa, V. D. Calhoun, and T. Adalı, "Extraction of time-varying spatio-temporal networks using parameter-tuned constrained IVA," *IEEE Transactions on Medical Imaging*, vol. 38, no. 7, pp. 1715—1725, July 2019.

S. Bhinge, Q. Long, V. D. Calhoun and T. Adalı, "Spatial dynamic functional connectivity analysis identifies distinctive biomarkers in schizophrenia," *Frontiers in Neuroscience, Brain Imaging Methods*, vol. 13, pp. 1006, 2019.

Q. Long, **S. Bhinge**, Y. Levin-Schwartz, Z. Boukouvalas, V. D. Calhoun, and T. Adalı, "The role of diversity in data-driven analysis of multisubject fMRI data: Comparison of approaches based on independence and sparsity using global performance metrics," *Human Brain Mapping*, vol. 40, issue 2, pp. 489—504, 2018.

X. Song, **S. Bhinge**, R. Quiton, and T. Adalı, "An ICA based Approach for Steady-State and Transient Analysis of Task fMRI Data: Application to Study of Thermal Pain Response," *Journal of Neuroscience Methods*, vol. 326, pp. 108356, 2019.

S. Bhinge, Q. Long, V. D. Calhoun and T. Adalı, "Adaptive constrained independent vector analysis: An effective solution for analysis of large-scale medical imaging data." *IEEE Transactions on Biomedical Engineering*. Submitted.

Q. Long, **S. Bhinge**, V.D. Calhoun, and T. Adalı. (2019) "Independent Vector Analysis for Common Subspace Analysis: Application to Multi-subject fMRI Data Yields Meaningful Subgroups of Schizophrenia." *NeuroImage*. Accepted.

CONFERENCE PUBLICATIONS

M. A. B. S. Akhonda, Q. Long, **S. Bhinge**, V. D. Calhoun, and T. Adalı, "Disjoint Subspaces for Common and Distinct Component Analysis: Application to Task FMRI Data," in *Annual Conference on Information Sciences and Systems (CISS)*, Baltimore, MD, 2019, pp. 1—6.

S. Bhinge, V. D. Calhoun, and T. Adalı, "IVA-Based Spatio-Temporal Dynamic Connectivity Analysis in Large-Scale fMRI Data," in *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Calgary, AB, 2018, pp. 965—969.

M. A. B. S. Akhonda, Y. Levin-Schwartz, **S. Bhinge**, V. D. Calhoun, and T. Adalı, "Consecutive Independence and Correlation Transform for Multimodal Fusion: Application to EEG and fMRI Data," in *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Calgary, AB, 2018, pp. 2311—2315.

X. Song, **S. Bhinge**, R. Quiton, and T. Adalı, "A two-level ICA approach reveals important differences in the female brain response to thermal pain," in *15th International Symposium on Biomedical Imaging (ISBI)*, Washington, DC, 2018, pp. 1377—1380.

S. Bhinge, Q. Long, Y. Levin-Schwartz, Z. Boukouvalas, V. D. Calhoun, and T. Adalı, "Non-orthogonal constrained independent vector analysis: Application to data fusion," in *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, New Orleans, LA, 2017, pp. 2666—2670.

S. Bhinge, Y. Levin-Schwartz, and T. Adalı, "Data-driven fusion of multi-camera video sequences: Application to abandoned object detection," in *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, New Orleans, LA, 2017, pp. 1697—1701.

D. Emge, Z. Boukouvalas, Y. Levin-Schwartz, **S. Bhinge**, Q. Long, and T. Adali, "Power spectra constrained IVA for enhanced detection of SSVEP content," in *51st Annual Conference on Information Sciences and Systems (CISS)*, Baltimore, MD, 2017, pp. 1—5.

S. Bhinge, Y. Levin-Schwartz, and T. Adalı, "Estimation of common subspace order across multiple datasets: Application to multi-subject fMRI data," in *51st Annual Conference on Information Sciences and Systems (CISS)*, Baltimore, MD, 2017, pp. 1—5.

Q. Long, **S. Bhinge**, Y. Levin-Schwartz, V. D. Calhoun, and T. Adalı, "A graph theoretical approach for performance comparison of ICA for fMRI analysis," in *51st Annual Conference on Information Sciences and Systems (CISS)*, Baltimore, MD, 2017, pp. 1—6.

S. Bhinge, Z. Boukouvalas, Y. Levin-Schwartz, and T. Adalı, "IVA for abandoned object detection: Exploiting dependence across color channels," in *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Shanghai, 2016, pp. 2494—2498.

S. Bhinge, Y. Levin-Schwartz, G. Fu, B. Pesquet-Popescu, and T. Adalı, "A data-driven solution for abandoned object detection: Advantages of multiple types of diversity," in *Global Conference on Signal and Information Processing (GlobalSIP)*, Orlando, FL, 2015, pp. 1347—1351.

POSTERS

IVA-Based Spatio-Temporal Dynamic Connectivity Analysis in fMRI Data, Graduate Research Conference, UMBC, Baltimore MD, March 2017.

PROFESSIONAL SERVICE

Journal	Transactions on Medical Imaging (IEEE)
paper	NeuroImage (Elsevier)
reviewer	Machine Learning for Medical Imaging (Journal of Healthcare Engineering)
Conference	International Conference on Acoustics, Speech, and Signal Processing (IEEE), 2017-2020
paper	International Symposium on Biomedical Imaging (IEEE), 2018
reviewer	International Workshop on Machine Learning for Signal Processing (IEEE), 2016

RELEVANT COURSEWORK

Graduate	Introduction to Machine Learning, Applied Multivariate Methods, Optimization Algorithms, Probability and Random Processes, Pattern Recognition, Detection and Estimation Theory, Matrix and Tensor Decompositions
Undergraduate	Signals and systems, Digital Signal Processing Digital Image Processing, Data Structures