SINJINI BANERJEE

https://sinjini77.github.io/SinjiniBanerjee/

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TECHNICAL SKILLS

Software tools	Matlab/Simulink | Jupyter Notebook| Eclipse | Colab| Tensorflow | Pytorch| Atom/ Uber-Juno |Gurobi Optimiser | Android Studio
Programming Languages	Julia | Python | C | SQL
Hardware Tools	Arduino | Programmable Logic Controllers (PLC)

EDUCATION

Rutgers University, NJ	Ph.D. – Electrical Engineering (Specialization: Information & Signal Processing)	GPA 3.93/4	Sept 2020 – Present
University at Buffalo – SUNY	M.S. - Electrical Engineering, Thesis: Signal optimization	GPA 3.62/4	June 2019
Heritage Institute of Technology, Kolkata, India	B.Tech - Applied Electronics & Instrumentation Engineering	GPA 8.35/10	July 2016

WORK EXPERIENCE

Graduate RA, Department of Electrical and Computer Engineering, Rutgers University Sept 2020 – Present

- Analyzing robustness of counterfactual explanations to predictive multiplicity observed in deep neural networks. (Ongoing)
- Developed a robust hypothesis testing framework for analyzing the run-to-run performance variability observed in deep neural networks, and formulated a metric for model selection which is more informative than test/validation accuracy. (Work done in collaboration with Pacific Northwest National Laboratory).
- Trained and fine-tuned deep net models (Feedforward, MLP, CNN, BERT) on HPC clusters at the Office of Advanced Research Computing at Rutgers.
- Performed efficient spectral unmixing to identify endmembers and their abundance maps by exploiting the high-dimensional structure of hyperspectral images.

Graduate TA, Department of Electrical and Computer Engineering, Rutgers University Sept 2020 – Present

- Conducting recitation classes for Introduction to Data Driven Design for Engineering Applications: 3D Modeling (CAD) and Matlab Programming. (Ongoing)
- Conducted recitation classes and supervised lab for Digital Logic Design.

Intern, Department of Electrical Engineering, University at Buffalo Aug 2019 – May 2020

- Implemented and compared different convex and non-convex optimization algorithms (e.g. Alternating Direction Method of Multipliers (ADMM), Coordinate Descent (CD), and General Iterative Shrinkage and Thresholding (GIST)), for robust detection of outliers in adaptive estimation of linear regression models.
- Improved the performance of all the implemented algorithms through parallel computing on clusters available at Center for Computational Research.

PAPERS

- Banerjee, S., Marrinan, T., Cannon, R., Chiang, T., & Sarwate, A. D. (2024). Measuring model variability using robust non-parametric testing. arXiv preprint arXiv:2406.08307 (Currently under review in IEEE JSTSP). June 2024
- Slavakis, K., & Banerjee, S. (2019). Robust hierarchical-optimization RLS against sparse outliers. IEEE Signal Processing Letters, 27, 171-175. January 2020

ACADEMIC PROJECTS

Understanding tensor decomposition for spectral unmixing in hyperspectral images (Utilized Matlab) Sept 2021 – Sept 2022

- Investigated low-rank tensor decomposition algorithms (Candecomp-Parafac and Block Term Decomposition) on hyperspectral images to understand the relation to spectral unmixing.

3D reconstruction and Panorama stitching of digital images (Utilized Matlab/Python) Sept 2021 – Oct 2022

- Reconstructed a 3-dimensional image in Matlab from two digital images.
- Performed panorama stitching in Python on two wide angle digital images.

Sensor application design for Android phone (Utilized Android Studio) Jan 2018 – Mar 2018

- Developed an application to read and test the data available from sensors embedded in an android device.

Musical Instrument Recognition using harmonics (Utilized Matlab) Oct 2017 – Dec 2017

- Used cepstral analysis to identify, study, and characterize individual notes of two different musical instruments, flute and piano, in the reverse frequency domain.

Classification of cancer subgroups using microarray gene expression data (Utilized Matlab) Sep 2016 – Mar 2017

- Used particle swarm optimization and adaptive K-nearest neighborhood technique on lung cancer data to classify cancer subgroups.
- Utilized t-test method for dimensionality reduction.
- Identified 14 genes that can be efficiently exploited for high accuracy diagnostic prediction.

Cardiac Healthcare with Android Referenced Monitoring (Utilized Android Studio) Aug 2015 – May 2016

- Designed an application using a photo-plethysmography setup fed into Arduino to reduce the door-to-balloon time in cardiac emergencies.

WORKSHOPS

- Bellairs Workshop on Machine Learning and Statistical Signal Processing for Data on Graphs. January 2023
- DIMACS Workshop on Modeling Randomness in Neural Network Training: Mathematical, Statistical, and Numerical Guarantees. June 2024

VOLUNTEERING

Director of Environmental Services, Rotaract Club of HITK, India June 2014 – June 2015

- Organized various environmental recycling projects such as setting up a vermicomposting system to recycle the college cafeteria food waste, in addition to organizing various city wide clean up drives.