PARHAM MOSTAME

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Summary

I am currently a Ph.D. candidate at the University of Illinois conducting multiple collaborative research studies in the field of Neuroscience. Given the complexity of brain data, I have gained expertise in data science, machine learning, and statistics over the past decade. My mission is to leverage cutting-edge techniques to improve on healthcare on a broad scale. I have conducted multiple personal projects in the field of healthcare to fine-tune my skills for such mission. I am a critical thinker with great communication skills, who fits well in interdisciplinary teams. I am seeking for data science/machine learning positions that aligns well with my mission and flourishes my potentials.

Technical skills in a nutshell

- Python: 4 years of experience
- MATLAB: 10 years of experience
- Data manipulation: pandas, SQL
- Data cleaning
- Machine learning
- Deep learning
- Signal processing
- Image processing
- Statistical testing
- Graph theory

Personal projects

- Developed a multiple-model multi-task deep learning model to predict health condition of five abdominal organs including internal bleeding using CT scan images in the 2023 RSNA Kaggle competition. After an in-depth data processing, I trained a UNet from scratch to segment the organs. Then, the segmentations along with the original image was fed to a multi-task CNN. I was ranked X out of X participants in this Kaggle competition and shared multiple highly rated notebooks.
- Implemented an SVM classifier to predict the state of the eyes (open or close) using scalp EEG recordings with 99% accuracy. This accuracy was only achievable due to intense data cleaning and proper feature extraction. I used multiple techniques such as ICA, interpolation, and filtering to extract strong features for this purpose.
- Mined the network of networks (NoN) in the human brain implementing MANE network embedding algorithm from scratch. Multiple functional networks exist across neural timescales. This project characterized the interactions between timescale-specific brain functional networks, shedding light on how the brain takes advantage of parallel information processing.
- Skin cancer classification to identify Melanoma cancer from any other benign skin condition.
- Implemented UNet architecture from scratch to segment breast cancer from the background.
- Implemented the Apriori algorithm for frequent pattern mining on a grocery store shopping list dataset.
- Developed a multi-step pipeline that accurately removes hairs from skin images to improve model performance.
- Implemented a Generative Adversarial Network (GAN) from scratch and applied on MNIST data.
- Implemented a Gaussian Mixture Model (GMM) from scratch and applied on simulated data.
- Trained a convolutional neural network classifying the CIFAR10 dataset with an accuracy of ~90%.

Education

- **Ph.D.** in Neuroscience with a minor in computer science at the University of Illinois at Urbana Champaign, IL, USA. (GPA: 4.0) (Current; 2018-2024)
- **M.Sc.** in Electrical Engineering – Biomedical Engineering at the University of Tehran, Tehran, Iran. (GPA: 4.0) (2015-2017)
- **B.Sc.** in Electrical Engineering – Control Systems at the University of Tehran, Tehran, Iran. (GPA: 3.2) (2010-2014)

Research Projects

- Predicted participant responses to upcoming ambiguous cognitive stimuli by using their fMRI brain data from only prior to the stimulus onset. I trained a kernel SVM on functional brain network data 5 seconds prior to the stimulus onset and was able to predict the way a participant would perceive the vague stimulus. This project emphasizes the theory that sees the brain as a predictive model of the environment.
- Led a pilot study that got funded by the NFS (National Foundation of Science) in 2023. I designed a Graphic User Interface (GUI) to create a cognitive task and collected behavioral responses of ~20 healthy subjects and finally extracted initial results that went into the grant application.
- Removed artefactual sources form EEG data (e.g. eye movement, cardiac cycles, muscle movement) using data cleaning techniques like ICA, filtering, interpolation, etc.
- Characterized brain dynamics by identifying the states of functional brain network patterns using either one of K-means and Hidden Markov Models.
- Studied the spatiotemporal features of functional brain network patterns using state-space visualization such as PCA , tSNE, and Self-organizing Maps.
- Developed an elaborated function to visualize dense networks with many edges by bundling neighboring edges together.

Honors & Awards

- Invited talk at the Mayo clinic, Rochester, MN, USA. (2022)
- Invited talk at Big Data Neuroscience Workshop, Ann Arbor, MI, USA. (2019)

Work Experience

- Setting up a collaborative infrastructure between the university of Illinois and the Carle hospital to collect intracranial human brain recordings from epileptic patients. I prepared the IRB documents and will be directly involved in data acquisition alongside the neurosurgeons. (Current; 2024)
- Mentoring undergraduate students for their summer internship and/or their volunteered research studies. (2019-2022)
- Teaching experience in relevant courses such as Digital signal processing, Digital image processing, Stochastic processes, Biomedical signal processing, etc. (2014-2020)

Certifications and Relevant courses

- Machine learning
- Principles of data mining
- Neural network modeling lab
- SQL for data science (Coursera)
- Digital signal processing
- Digital image processing
- Biomedical signal processing
- Stochastic processes
- Applied data science Coursera specialization

Publications [Please see the full list on google scholar]

- Mostame P., Wirsich J., Alderson T., Ridley B., Giraude A., Carmichael D. W., Vulliemoz S., Guye M., Lemieux L., Sadaghiani S. (2022). "Concurrent fMRI and intracranial EEG capture spatially similar connectome states at asynchronous and frequency-specific times". bioRxiv.
- Mostame P., & Sadaghiani S. (2021). "Oscillation-based connectivity architecture is dominated by an intrinsic spatial organization, not cognitive state or frequency". Journal of Neuroscience, 41(1), 179-192.

Hobbies

- Volleyball, Boxing, Cooking, Watching YouTube, House plants, Ping Pong, Nonfiction books.