PARHAM MOSTAME

Coding portfolios: GitHub | Kaggle
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As a Ph.D. candidate at the University of Illinois, I lead collaborative research in Neuroscience, utilizing machine learning, data science, and statistics to navigate the complexities of brain data. Over the past decade, my journey has been a dynamic fusion of academic pursuit and hands-on experience, refining proficiency at the intersection of machine learning and brain sciences. My mission is to pioneer healthcare advancements using cutting-edge techniques. I have conducted personal projects to fine-tune my skills for this mission. As a critical thinker with excellent inter-personal skills, I thrive in interdisciplinary environments.

Technical expertise

- Python (4 years) & MATLAB (10 years)
- Data cleaning & manipulation [SQL | Pandas]
- Machine learning [Sklearn]
- Deep learning [PyTorch | Albumentation]
- Signal processing [NumPy | SciPy]
- Image processing [OpenCV]
- Statistics and stochastic processes
- Network analysis [NetworkX]
- Human biomedical data [fMRI | EEG | CT]

Education

- Doctoral degree in neuroscience –with a minor in computer science– at the University of Illinois at Urbana Champaign, IL, USA. (GPA: 3.9) (2018-2024)
- Master's degree in biomedical engineering at the University of Tehran, Tehran, Iran. (GPA: 4.0) (2015-2018)
- Bachelor's degree in electrical engineering (control systems) at the University of Tehran, Tehran, Iran. (GPA: 3.2) (2010-2015)

Selected Research Projects

- Decoded fMRI brain data to predict human perception. Participant responses to forthcoming ambiguous visual stimuli were predicted by a finely tuned kernel SVM model trained on functional brain network data collected a mere five seconds prior to stimulus onset. (2023)
- Led a pilot study funded by NFS, implementing a real-time GUI for cognitive task design, and collecting behavioral responses of ~40 healthy subjects. (2023)
- Identified brain states using clustering, exploring spatiotemporal convergence between functional networks of fMRI and intracranial EEG. (2020-2022)
- Implemented a data cleaning pipeline for EEG, including visual inspection, filtering, interpolation, ICA, and spectral analysis. (2021)

Selected Personal Projects

- Implemented a multiple-model multi-task deep learning architecture to detect presence of abdominal trauma concurrently in five abdominal organs, using over 400GB of CT images. After an in-depth data inspection and cleaning, I trained a 2D U-Net from scratch to segment the organs. Then, CT images masked with extracted segmentations were fed to CNN architectures to identify the extent of abdominal trauma in each organ. (2023)
- Designed a CNN architecture to classify Melanoma skin cancer from other benign skin conditions with a high accuracy (>90%). (2023)
- Implemented a high-performance 2D U-Net from scratch to segment cancerous regions of breast. (2023)
- Implemented a Convolutional Generative Adversarial Network from scratch to generate augmented samples in MNIST data. (2023)
- Constructed a high-precision SVM classifier (>99%) for predicting eye state from scalp EEG data. This accuracy was achieved due to rigorous data cleaning and feature extraction, utilizing ICA for blink artifact removal, interpolation for electrode jump correction, and zero-phase filtering for alpha band oscillations. (2022)
- Constructed Network of Networks (NoN) in the brain by implementing MANE algorithm from scratch using EEG data, emphasizing interactions among multiple functional networks across neural timescales. (2022)
- Implemented the A-priori algorithm for frequent pattern mining on a grocery store shopping list dataset. (2021)

Honors & Awards

- Selected for "Data Science - Wearables Intern" at Verily (formerly Google Life Sciences) among 1340 applicants; opted not to proceed. (2022)
- Invited talk at the Mayo clinic, Rochester, MN, USA. (2022)
- Graduate student fellowship of Beckman institute for advanced science and technology (one out of seven total awardees), IL, USA (2020)
- Invited talk at Big Data Neuroscience Workshop, Ann Arbor, MI, USA. (2019)

Certifications

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

Work Experience

- Initiating collaboration for intracranial brain recordings between the University of Illinois and Carle Hospital, spearheading IRB preparation. (2022-Current)
- Mentoring undergraduate students for their summer internship and volunteer research studies. (2019-2022)
- Teaching experience in relevant courses such as Digital signal processing, Digital image processing, Stochastic processes. (2014-2020)

Selected Publications

- 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, House plants, Ping Pong, Nonfiction books.