Jiazhen Hong

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Personal Statement

I am a third year Ph.D. student working at the Integrated Systems & NeuroImaging Laboratory at Rutgers University, advised by Professor Laleh Najafizadeh. My primary research interests include machine learning algorithms, electroencephalography (EEG)-based brain-computer interfaces (BCIs), signal processing, and natural language processing (NLP).

Education

Ph.D. Candidate in Electrical and Computer Engineering
02/2020 – Present

Rutgers University, New Brunswick, NJ, USA
GPA: 3.9/4.0
Advisor: Professor Laleh Najafizadeh

M.S in Electrical Engineering
09/2017 – 01/2019

Stevens Institute of Technology, Hoboken, NJ, USA
GPA: 3.9/4.0
Advisor: Professor Shucheng Yu

B.S. in Communication Engineering
09/2012 – 06/2016

Jimei & Chung Yuan Christian University, China
GPA: 3.5/4.0

Publications

Refereed Journal Papers
(Under review)

[1] **J. Hong**, W. Qian, Y. Chen, and Y. Zhang, “A geometric approach to k-means,” submitted.

(In Preparation)

[2] **J. Hong**, W. Wang, S. Haghani, and L. Najafizadeh, “Subject-specific Channel Selection Based on Davies- Bouldin Index for EEG Motor Imagery Classification,” in preparation.

[3] **J. Hong**, W. Wang, and L. Najafizadeh, “A Mind-controlled Speller System Incorporating NLP for P300-Based Brain-Computer Interfaces,” in preparation.

Refereed Conference Papers

(Under review)

[1] **J. Hong**, L. Najafizadeh, "P3T: A Transformer Model for Enhancing Character Recognition Rates in P300 Speller Systems," submitted to 58th Annual Asilomar Conference on Signals, Systems, and Computers.

(Accepted/Published)

[2] **J. Hong**, F. Shamsi, and L. Najafizadeh, "A Deep Learning Framework Based on Dynamic Channel Selection for Early Classification of Left and Right Hand Motor Imagery Tasks," Proc. of 44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'22), Glasgow, Scotland, July 2022, pp. 3550-3553.

Awards

Rutgers University Received: 05/2024	Best TA Award (for Fall 2023)

Technical Expertise

Licenses & certifications	[1] Biomedical / Clinical Research Investigators Credential ID 47466781 [2] Institutional/Signatory Official: Human Subject Research Credential ID 47461645
Programming Languages:	Python, MATLAB, R
Software & Tools:	Gene Set Enrichment Analysis (GSEA), EEGLAB, GitHub, Haploview, Anaconda, Google Colab, Brain Products, actiCAP, E-Prime, VS Code, Overleaf, Markdown, Typora
Hardware:	Raspberry Pi, Arduino, VEX-brain, Brain Products, actiCAP

Teaching Experience

Course Instructor 06/2022 – 08/2022	Linear Systems and Signals (14:332:345)
Teaching Assistant 02/2020 – 05/2024	Digital Signal Processing (14:332:346) Digital Signal Processing Lab (14:332:348) Linear Systems and Signals (14:332:345)

Projects

Human-Computer Interaction Speller using NLP Models
Rutgers University, NJ, USA
01/2023 – Present
Objective: Developing a speller system to assist individuals with disabilities who are unable to communicate verbally.

- Acquired Electroencephalogram (EEG) signals
- Developed a real-time speller system and established communication between two devices using the TCP/IP protocol. One device serves as a graphical user interface (GUI) while the other handles data
- Analyzed subject brain activity through the oddball paradigm to identify their target characters
- Integrated NLP models with the speller system

Channel Optimization for Motor Imagery-based Brain Computer Interfaces (BCIs)
Rutgers University, NJ, USA
01/2021 – 12/2022
Objective: Designing a reliable model for BCI systems to assist people in controlling prosthetic devices

- Pre-processed signals using EEGLAB/ MATLAB, employing denoising techniques such as Independent Component Analysis (ICA) and Short-time Fourier transform (STFT).
- Analyzed neural activities to extract critical information from the brain's spatial/temporal domain.
- Implemented deep learning models for the classification of motor imagery tasks.

Machine Learning Algorithm Optimization
Rutgers University, NJ, USA
02/2020 – 01/2021
Objective: Optimizing the k-means algorithm to mitigate issues related to local minima.

- Explored a geometric approach to k-means to address local minimum challenges.
- Validated our proposed k-means algorithm variant through mathematical and theoretical derivation.
- Conducted experiments on both benchmark datasets and real-world datasets to prove our algorithm.

Biostatistics related to Cancer Prediction
Harvard Medical School, MA, USA
05/2019 – 11/2019
Objective: Enabled early cancer detection with protein analysis, minimizing reliance on Magnetic Resonance Elastography.

- Conducted protein analysis of patient samples provided by hospitals, employing the Benjamini-Hochberg statistical technique to identify significant proteins for cancer prediction.
- Utilized selected proteins to apply machine learning techniques for predicting patient health status.
- Emphasized precision over recall in the model evaluation phase due to the critical importance of early cancer detection. A false positive is preferable to a false negative.