Alexander Ratzan
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Education

New York University (NYU) New York, NY
PhD in Computer Science September 2023-Present
Focus: Neuroinformatics. *GPA:* 3.93. *Coursework:* Design & Analysis of Algorithms, Machine Learning, Algorithmic Machine Learning & Data Science, Deep Learning, Applied Genomics & Network Modeling, Protein Design, Neuroinformatics, Big Data, Mathematical Tools for Neuroscience

Tufts University Medford, MA
Bachelor of Science in Cognitive & Brain Sciences December 2021
GPA: 3.75

Awards & Fellowships

National Defense Science and Engineering Graduate (NDSEG) Fellowship May 2024
First NYU Engineering student to receive award

NYU School of Engineering Fellowship from Department of Computer Science & Engineering May 2023

National Science Foundation Graduate Research Fellowship Program - Honorable Mention March 2023

New England Small College Athletic Conference All-Academic Team Fall 2018, 2019, 2021

Research & Professional Experience

Neuroinformatics Lab, NYU Tandon CSE Brooklyn, NY
Doctoral Researcher September 2023-Present
Advisor: Erdem Varol

- Developing novel, efficient, and scalable methods for population-level analysis of neural data.
- Applying statistical modeling and deep learning techniques to understand the relationship between the genome, gene expression, and brain connectivity patterns. (in development: github.com/neuroinfolab/GeneEx2Conn/)
- Mentoring two graduate students on Master's theses. Mentored lab's first local high school intern.
- Visiting researcher at Penn Artificial Intelligence in Biomedical Imaging Lab, Reviewer for eLife Journal

Columbia University Dept. of Neurology and Mental Health Data Science Division New York, NY
Neuroimaging Research Technician/Data Analyst February 2022 – July 2023

- Curated custom preprocessing, quality assurance, and data analysis pipelines for neuroimaging data.
- Identified biomarkers of language impairment in Multiple Sclerosis (MS) patients by calculating novel graph-theoretical metrics from functional neuroimaging data.
- Performed advanced feature engineering of longitudinal clinical data from over 10,000 patients.
- Identified 3 cognitive phenotypes of MS patients via the implementation of Subtype and Stage Inference algorithm using mixture modeling, Expectation-Maximization, and Markov Chain Monte Carlo.

Merck - SALAR Digital Operations and Innovation West Point, PA
Data Science Intern May 2021 – August 2021

- Designed a rapid web-scraping capability to generate a drug target safety review document containing intuitive visualizations and analytics. Modernized an 8+ hour research process to take less than 1 minute. Interfaced with multiple types of 'omics' data (genomic, transcriptomic, proteomic).
- Created a custom PubMed search ranking algorithm utilizing natural language processing methods such as Okapi BM25 ranking to improve search results for investigators evaluating novel drug targets.

Tufts Integrative Cognitive Neuroscience Lab Medford, MA
Research Assistant September 2020 – September 2023

- Applied a general linear model to explain the relationship between resting state brain activity and memory performance in noisy environments.
- Supported research for thesis, 'Characterizing pre-stimulus alpha dynamics that predict stimulus-evoked cortical responses and sensory processing'.

Mira Therapeutics Remote/Hoboken, NJ
Software Development Intern June 2020 – November 2020

- Developed android app for helping patients recover from trauma symptoms and PTSD.
- Collaborated with two senior developers to engineer interactive features throughout the app including our analytics page, user interface, and grounding exercise tools.
- Designed and implemented full stack notification system sending scheduled reminders and notifications based on user activity to increase user engagement and retention rate.

Tufts Human-Computer Interaction Lab Medford, MA
Research Assistant February 2019 – August 2019

- Collaborated with graduate students on research in 'Brain-Computer Interaction using Functional Near Infrared Spectroscopy' using support vector machines to quantify mental workload on various tasks.
- Acted as neuroscience consultant aiming to improve experimental design.

Publications

Ratzan, A., Dong, J., Faizal, S., Raj, R., Varol, E. (2024). Predicting the resting-state functional connectome from regional gene expression in human population datasets. *Society for Neuroscience*

Ratzan, A., Patel, M., Galioto, R., Hancock L., Leavitt V.M. (2024). Deriving clinical subtypes with unsupervised learning and event-based modeling in a large multiple-sclerosis cohort. *Manuscript in preparation*

Leavitt, V.M., Dworkin, J., Kalina, T., **Ratzan, A.** (2024). Sex differences in brain resilience of individuals with multiple sclerosis. *Multiple Sclerosis and Related Disorders*

Leavitt, V.M., Dworkin, J., Galioto, R., **Ratzan, A.** (2024) Disparities in DMT treatment: Demographic and neurocognitive differences between MS patients currently treated versus not treated with disease-modifying therapies. *Multiple Sclerosis and Related Disorders*

Ratzan, A., Siegel, M.D., Karanian, J.M., Thomas, A.K, Race, E. (2023). Intrinsic functional connectivity in medial temporal lobe networks is associated with susceptibility to misinformation. *Memory*

Ratzan, A., Simani, L., Dworkin, J., Buyukturkoglu, K., Riley, C.S., Leavitt, V.M. (2023). Characterizing the extended language network in individuals with multiple sclerosis. *Americas Committee for Treatment and Research in Multiple Sclerosis*

Buyukturkoglu, K., Lu, L., Yang, H., **Ratzan, A.**, Sideras, P., Leavitt, V.M., Lignelli-Dipple, A., Binsheng, Z., Riley, C.S., De Jager, P. (2022). Thalamus-derived Radiomic Features to Predict Symbol-Digit Modalities Test Results in MS. *The European Committee for Treatment and Research in Multiple Sclerosis*

Skills & Software

Side Project Repository: alexander-ratzan.github.io/projects/
Programming Languages: Python, Bash, R, Matlab, Java, C++, Javascript
Packages: NumPy, SciPy, scikit-learn, PySpark, PyTorch, Pandas, Keras, TensorFlow, matplotlib, Jupyter, AWS, Git
Systems: high-performance computing cluster, linux, cloud-based
Neuroimaging Software: SPM, CONN, FSL, Freesurfer, Lesion Segmentation Toolbox, ANTS, Tracula, Nipy, nilearn
Languages: French, Dutch