# Rajdeep Singh

(475)-292-9261| rajdeepsingh9613@gmail.com |www.linkedin.com/in/rajdeepsingh13 | https://rs1ngh13.github.io/

## EDUCATION:

**Master of Science in Data Science** September 2024- May 2025
Boston University College of Computing and Data Science, Boston, MA
*GPA: 3.85/4.00;* Dean's Circle

**Bachelor of Science in Neuroscience** January 2021- May 2024
Boston University College of Arts and Sciences, Boston, MA
*GPA: 3.57/4.00;* Dean's Circle

## WORK EXPERIENCE:

**Computational Neuroscience and Vision Lab**, Boston, MA December 2023 – May 2024
*Research Assistant*

- Led a computational project analyzing neural signal transmission in multiple sclerosis, revealing quantifiable differences in speed and size between healthy and affected neurons to support early-detection research.
- Investigated schizophrenia's impact on visual perception by synthesizing literature across spatial and temporal scales, providing foundational insights for a neurobiologically-informed model of visual dysfunction.
- Collaborated with team members on a scientific review, co-authoring and refining a manuscript aimed at uncovering the neural mechanisms behind perceptual impairments in schizophrenia.

## RELEVANT PROJECTS:

**Equity Analysis in Congressionally Directed Spending (CDS) –** *Boston University x Senator Ed Markey's Office* Fall 2024

- Led a team in partnership with Senator Ed Markey's Office to evaluate equity in federal earmark funding, uncovering structural biases that misrepresented resource allocation across Massachusetts.
- Delivered biweekly policy briefings to congressional aides, influencing the redesign of the CDS intake form for greater geographic and demographic inclusivity.
- Built a reproducible analysis pipeline using Python and Looker studio to analyze disparities by race, income, and location, enabling data-drive recommendations at the federal level.
- Discovered systemic form design flaws that obscured the needs of under-resourced communities, resulting in targeted recommendations for form revision and data transparency.
- Developed and deployed interactive dashboards and charts that visualized equity gaps, directly supporting policy advocacy efforts and constituent communication.

**Alzheimer's Disease Detection with 3D MRI and CNNs** Spring 2025

- Developed a custom 3D CNN to classify Alzheimer's stages (CN, MCI, AD) using T1-weighted MRI data, achieving 93.27% validation accuracy outperforming common 2D architectures.
- Engineered a preprocessing pipeline that isolated hippocampus and amygdala regions using ± 2D slice thresholds by sex and diagnosis, which improved spatial targeting for model inputs.
- Compared custom CNN against VGG-16, ResNet18, and ResNet50 in both 2D and 3D settings, and found that the custom CNN and ResNet18 achieved high generalization while others overfit.
- Leveraged ResNet18 activation maps to refine spatial input selection, leading to more focused region targeting and improved prediction stability in the custom CNN.
- Tuned model hyperparameters using Weights & Biases and applied min-max normalization with small batch training, which optimized convergence and reduced memory bottlenecks.

**Multi-Task Reinforcement Learning for Atari Games** Spring 2025

- Trained DQN, PPO, and A2C agents on Pong, Breakout, and Beamrider to study policy generalization in multitask settings, which demonstrated strong adaptability across tasks.
- Implemented a Multi-Head DQN with a shared convolutional backbone and task-specific heads, resulting in strong baseline performance and reduced retraining needs
- Conducted zero-shot evaluations on Space Invaders and River Raid; observed partial generalization with improved behavior over random baselines, but limited reward performance.
- Ran ablation studies comparing single-task and multi-task setups, confirming that multi-task agents retained comparable performance while reducing retraining needs.

## SKILLS/QUALIFICATIONS:

**Programming & Scripting:** Python (Pytorch, TensorFlow, NumPy, Pandas), R, SQL, MATLAB
**Data Engineering & DevOps Tools:** Azure, Google Cloud Platform, Docker, Power BI, Looker Studio
**Machine Learning & Modeling:** Supervised Learning, CNNs, Transfer Learning, Hyperparameter Tuning, Model Evaluation, Time Series Forecasting
**Data Analysis & Visualization:** Exploratory Data Analysis (EDA), Geospatial Analysis, Matplotlib, Seaborn, Power BI, Looker Studio
**Databases & Pipelines:** SQL, NoSQL, Data Warehousing (BigQuery), ETL/ELT Pipelines, Data Cleaning, API Integration