Mays Neiroukh

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EDUCATION

- **Carleton College** Northfield, MN
  B.A., Computer Science; minor in Mathematics; minor in Statistics and Data Science *Jun 2025*

  Related Coursework: Data Structures; Software Design; Introduction to Statistics; Introduction to Statistical Inference; Probability; Mechanics and Thermodynamics; Genes, Evolution, and Development and Lab; General Chemistry (I); Machine Learning; Natural Language Processing; Electromagnetism and Optics; Energy Flow Biological Systems.

RESEARCH

- **Noise-Resilient and Interpretable Glioblastoma Few-Shot Classification** Northfield, MN
  Department of Computer Science, Carleton College *Sep 2024 — Present*
  - Develop a noise-resilient sampling algorithm designed for prototypical networks, enhancing model robustness to explicit and implicit biases in few-shot learning scenarios.
  - Tackle data bias and noise challenges by introducing a multi-feature bias-balanced sampling approach, optimizing the selection of prototypes and boosting generalization capabilities in complex, real-world datasets.
  - Collect and preprocess NIfTI and DICOM MRI images, handling complex medical imaging data formats to prepare an organized dataset for prototypical network training, ensuring compatibility and accuracy in subsequent model evaluations.
  - Design and execute experiments across multiple noise types and intensities (e.g., Gaussian, orientation, resolution), demonstrating algorithmic resilience and outperforming standard baselines by maintaining high classification accuracy in noisy environments.
  - Present a research poster on the noise-resilient sampling algorithm and key findings at Computer Science Fall Comps Gala, and develop a project website to showcase methodologies, data visualizations, and insights.
- **Volumetric Reparameterization of the Brain using Conformal Mapping** Jacksonville, FL
  Department of Radiology, Mayo Clinic *Jun 2024 — Present*
  - Optimize a novel volumetric conformal mapping approach to reparameterize NIfTI images of the brain, establishing a bijective mapping between the brain and the topologically equivalent sphere.
  - Develop and integrate algorithms, including a KD-tree structure in MATLAB to search for ten neighboring points along each fiber streamline and compute a weighted average, establishing accurate fiber mapping in the target domain.
  - Utilize deep learning techniques, including convolutional neural networks (CNNs), to segment and analyze white matter fibers, enhancing the identification of anatomically meaningful bundles.
  - Optimize NIfTI image processing workflows in brain imaging, applying iterative finite difference schemes to solve Laplace's equations and track heat-flow lines for brain fiber clustering.
  - Ensure high numerical accuracy through rigorous continuous testing, significantly improving the efficiency and precision of volumetric parameterization and streamline computations.
- **Leveraging Machine Learning in the Design of Novel Ionic Liquids** Milwaukee, WI
  Fluid Power Institute, Milwaukee School of Engineering *Jun 2023 — Aug 2023*
  - Optimized a Python codebase for data analysis, significantly enhancing the novelty of ionic liquid property predictions by 57% and improving its accuracy to 98.3%.
  - Preprocessed and cleaned over 100,000 data points on various ionic liquid properties, ensuring data quality and preparing the dataset for reinforcement learning model integration.
  - Utilized Python libraries (NumPy, Pandas, Matplotlib, Scikit-learn) to streamline data processing, enhance predictive models, and create insightful visualizations of ionic liquid properties.
  - Collaborated with a multidisciplinary team of researchers and professors on the design and implementation, contributing to a more robust prediction of ionic liquid properties.

PUBLICATIONS *Work in progress*

Mitchell Johnstone, Mays Neiroukh, Pawan Panwar, and Subha Kumpaty. Leveraging Machine Learning in the Design of Novel Ionic Liquids.

ABSTRACTS and PRESENTATIONS

Mays Neioukh, Tori Shen, Barry Han, and Geoffrey Jing. Towards Noise-Resilient Few-Shot Learning: Optimizing Prototypes for Glioblastoma Classification. *Carleton College Comps Gala*; 2024, Northfield, MN.

Mays Neioukh, Vikash Gupta, Elena Greco, and Erik Middlebrooks Volumetric Reparameterization of the Brain Using Conformal Mapping with Applications to White Matter Clustering. *Carleton College Symposium*; 2024, Northfield, MN.

Mays Neioukh and Mitchell Johnstone. Leveraging Machine Learning in the Design of Novel Ionic Liquids. *National Conference on Undergraduate Research (NCUR)*; 2024, Long Beach, CA.

Mays Neioukh, Amira Aladetan, Sam Zacks, Eden Bergene, and Felecia Fick. Presentation Details are Confidential and Subject to NDA. *Mayo Clinic*; 2024, Rochester, MN.

WORK

- **L-eaf Labs Intern** — Northfield, MN
  L-eaf Organization — *Mar 2024 — Present*
  - Collaborate closely with clients to contribute to the development of an Agile learning AI tool, ensuring alignment with educational needs, institutional goals, and evolving industry objectives for optimal impact.
  - Refine project deliverables to consistently exceed customer expectations by enhancing quality and timeliness, while actively engaging in team collaboration to resolve complex challenges and optimize innovative solutions.
  - Streamline project management and delivery processes by leveraging Agile methodologies, incorporating detailed flow metrics, and managing tasks through Kanban boards to enhance team coordination and improve efficiency.
  - Perform comprehensive market analysis, including competitor and SWOT analyses, to identify opportunities for improvement and ensure the AI tool's long-term competitive edge in the education technology sector.
- **Resident Assistant** — Northfield, MN
  Residential Life, Carleton College — *Sep 2022 — Present*
  - Utilize strong analytical problem-solving skills to promptly address a wide range of resident concerns, creating a more inclusive and welcoming living environment for all community members.
  - Demonstrate project planning and budgeting capabilities by organizing a variety of educational and social events, collaborating with multiple campus partners to ensure broad engagement and successful execution.
- **Mayo Clinic Innovation Scholar** — Rochester, MN
  Department of Business Development, Mayo Clinic — *Oct 2023 — Mar 2024*
  - Conducted comprehensive assessments of intellectual property to support Mayo Clinic's strategic growth in medical technology, specifically within the radiology sector.
  - Performed detailed competitor and SWOT analyses under NDA, utilizing statistical methods to evaluate market positioning and technology potential for radiology advancements.
  - Collaborated with an interdisciplinary team to integrate diverse perspectives into comprehensive intellectual property strategies, enhancing the quality and relevance of recommendations.
  - Advised Mayo Clinic personnel on licensing strategies by conducting stakeholder analysis, profit projections, and identifying potential licensees, contributing to the commercialization of innovative technologies.
  - Co-authored an in-depth paper detailing comprehensive intellectual property strategies and their significant impact on advancing medical imaging technology innovation.

TECHNICAL SKILLS

Programming Languages: Java, Python, C/C++, SQL, JavaScript, HTML/CSS, R, Matlab
Developer Tools: Git, Google Cloud Platform, VS Code, Visual Studio
Frameworks: Flask, Flask API
Libraries: Pandas, NumPy, Matplotlib, Sckitlearn, Keras, PyTorch, ntlk, tqdm

LABORATORY SKILLS

Molecular Biology Techniques: PCR, Gel Electrophoresis
Analytical Techniques: UV-Vis Spectroscopy, Mass Spectrometry, Laboratory Calculations
Imaging and Data Analysis: NIfTI image processing, MATLAB for image segmentation and volumetric analysis
Sequence Analysis Tools: 4Peaks, Clustal Omega
Safety Protocols: Certified in ACS Essential Lab Safety for General Chemistry; experienced with chemical hygiene and safety protocols in biomedical laboratories.

PROJECTS

- **Risk Assessment Platform for Multiple Myeloma and Related Disorders** *Sep 2024 — Present*
  Stratification for Myeloma and Risk-Adapted Therapy, Mayo Clinic
  - Develop and launch a comprehensive, user-friendly website and app for hematology patients and physicians to calculate risk stratification of patients with treated Multiple Myeloma.
  - Integrate advanced data analysis and risk modeling techniques to estimate disease progression risks in conditions such as Multiple Myeloma, Smoldering Myeloma, MGUS, and Amyloidosis, empowering more informed clinical decisions.
  - Demonstrate knwoledge in full-stack development, combining Flutter for mobile front-end and Python for back-end processing, ensuring seamless user experience and impactful results for healthcare providers and patients.
- **Chronic Disease Data Visualization Platform Developer** *Apr 2024 — Jun 2024*
  Department of Computer Science, Carleton College
  - Collaborated with a team to design and develop an intuitive, user-friendly website for the visualization of over 100,000 chronic disease data points, enhancing accessibility to health information.
  - Developed a user-friendly platform that provides detailed chronic disease indicators in the United States over the past decade, aiding researchers, healthcare professionals, and pharmaceutical companies.
  - Utilized tools and technologies including Python, SQL, JavaScript, HTML/CSS, and visualization libraries such as Plotly and D3.js to build and optimize the platform.
- **Diabetes Prediction Neural Network Specialist** *Feb 2024 — Mar 2024*
  Department of Computer Science, Carleton College
  - Developed a multi-neural network to predict diabetes with over 90% accuracy, preprocessing a dataset of 30,000 data points, including feature scaling, addressing data imbalance, and data cleaning, to enhance model performance.
  - Mastered model optimization through hyperparameter tuning, implementing adaptive learning rates and dropout regularization, showcasing acumen in TensorFlow and Keras to improve precision and recall by over 10%.
  - Translated complex model outputs into strategic insights with visualizations of key performance metrics, demonstrating proficiency in Python, data analysis, and visualization libraries for impactful cross-functional communication.

CERTIFICATIONS

- **Mental Health First Aid** *Issued: Sep 2022*
  Issued by: National Council of WellBeing
- **Learning Fusion 360 Certification** *Issued: Aug 2024*
  Issued by: LinkedIn
- **ACS Essential Lab Safety for General Chemistry** *Issued: Sep 2023*
  Issued by: ACS Institute

COMMUNITY INVOLVEMENT

- **Alzheimer's Buddy** Northfield, MN
  Three Links Care Center *Mar 2024— Present*
  - Provided companionship and emotional support to Alzheimer's patients through regular visits, helping to build trust and a comforting presence.
  - Facilitated memory-stimulating activities, including storytelling, puzzles, and games, to promote cognitive engagement and social interaction.
  - Assisted patients with essential daily tasks to support independence while ensuring their safety and emotional well-being.
- **CS Tea Colloquium Attendee** Northfield, MN
  Computer Science Department, Carleton College *Jan 2024— Present*
  - Attended research-focused colloquium sessions, engaging with weekly presentations by experts from academia, industry, nonprofits, and government on cutting-edge topics in and adjacent to computer science.

- Submitted detailed reports on insights from each talk, fostering a deeper understanding of diverse research areas and current trends within the field.
- Connected with a diverse community of peers and professionals, actively participating in discussions and post-event networking opportunities to deepen understanding of computer science topics.

- **Co-President of Middle East and North African Organization** Northfield, MN
  Carleton College *Sep 2022 — Present*
  - Organized around over 18 events to help build a community for Middle Eastern and North African students at Carleton College.
  - Hosted and coordinated multiple fundraising initiatives to support earthquake relief efforts in Turkey and Syria, raising awareness and engaging the community in meaningful contributions.
  - Oversaw the management of social media accounts, designed strategic advertisements, and developed engagement campaigns to maximize outreach and strengthen the organization's online presence.

AFFILIATIONS and INVOLVEMENT

Midwest Mathematical Biology Seminar *Jan 2024 — Current*
Girls Who Code *Sep 2023 — Current*
Rewriting the Code *Sep 2023 — Current*
Society of Women Engineers *Sep 2023 — Current*
Milwaukee Bucks STEAM Camp Volunteer *July 2023*

COURSEWORK

- **Molecular Biology** *Aug 2024 — Present*
  MITx
  - Explore DNA transcription to RNA and genetic transposition, gaining a comprehensive understanding of the central dogma of molecular biology, encompassing the intricate processes of DNA replication, transcription, and translation.
  - Conduct experimental design and data analysis, applying advanced molecular biology techniques and genome sequencing assays. Develop proficiency in interpreting sequencing data and optimizing experimental protocols.
  - Cover transcription processes in prokaryotes and eukaryotes, focusing on regulatory mechanisms and the role of transposable elements in genetic diseases. Develop a strong understanding of gene regulation and its impact on hereditary conditions.
  - Gain practical knowledge of CRISPR technology, protein structure analysis, and interpretation of complex biological data. Build skills in using bioinformatics tools to analyze genetic information and predict protein functions.

- **AI for Medicine Specialization** *Sep 2024 — Present*
  DeepLearning.AI
  - Gain hands-on experience using convolutional neural networks and random forest predictors to solve real-world medical challenges, including diagnosing lung and brain disorders and predicting heart disease outcomes.
  - Develop practical skills in applying advanced AI techniques, such as image classification, segmentation, risk modeling, and survival estimation, tailored specifically for healthcare applications.
  - Bridge AI and healthcare, learning to integrate machine learning models with clinical data to drive advancements in personalized medicine, without requiring prior medical expertise.