Adam Kurth

adamkurth.github.io
linkedin.com/in/adam-kurth
github.com/adamkurth

Email : adammkurth@gmail.com
Mobile : 816-289-1956

Research Interests

With a foundation in mathematics, statistics, and personal healthcare experiences, I am committed to advancing biostatistics through rigorous theory and impactful applications. Particularly, I am interested in research focuses on causal inference, decision-making frameworks, and machine learning, with applications in neurodegenerative diseases, oncology, organ transplantation, and areas of treatment, prevention, and prediction. I am also dedicated to teaching and aspire to become a tenured professor.

Education

Arizona State University — Tempe, AZ
Master of Science, Statistics – Academic Track — *Aug. 2023 – Present*
Bachelor of Science, Mathematics (Statistics) – Summa Cum Laude — *Aug. 2021 – Aug. 2024*
Minor in Philosophy — *3.85/4.00*

Scottsdale Community College — Scottsdale, AZ
General Studies — *Aug. 2020 – May 2021*
3.84/4.00

East Valley Institute of Technology — Mesa, AZ
Graphic Design — *2019-2020*

Research Experience

- **School of Mathematical and Statistical Sciences** — Tempe, AZ
  Research Assistant (as MS student) under Dr. Eleni Panagiotou — *(Anticipated) Jan. 2024*
  - Developing novel mathematical tools using knot theory to analyze and classify protein folding patterns, contributing to NIH-funded research on protein structure-function relationships.
  - Implementing computational methods combining topology and molecular dynamics to predict protein misfolding in neurodegenerative diseases.
- **UGenome AI** — (Remote) Tucson, AZ
  Bioinformatics Intern — *Nov. 2024 – Present*
  - Developing MAXX software platform in Python to generate customized reference genomes, enhancing mutation calling sensitivity and specificity in next-generation sequencing data analysis.
  - Implementing computational pipelines for DNA and RNA mutant allele frequency quantification, optimizing variant detection algorithms for improved accuracy.
- **Decision Theater** — Tempe, AZ
  Research Aide — *Aug. 2024 – (Anticipated) Jan. 2025*
  - **understand_nlp_sentiment_analysis**: Sole researcher on podcast sentiment analysis and the important role of targeted messaging in the 2024 presidential election.
  - Enhanced research in policy initiatives by delivering presentations, drafting briefs, managing databases, executing models, and meticulously preparing materials for publication.
- **NASA Glenn Research Center (GRC)** — Cleveland, OH
  Internship with CHP-PRA Team — *Jun. 2024 – Aug. 2024*
  - Sole researcher in charge of implementing supervised and unsupervised NLP classification models using scikit-learn and PyTorch for health impact and assessment on planning Mars missions.
  - Addressed imbalanced multi-label classification challenge by extracting maximum contextual understanding from Mars task descriptions and predicting human system task categories, ensuring comprehensive analysis.
- **Compact X-ray Free Electron Laser (CXFEL)** — Tempe, AZ
  Research Aide under Dr. Sabine Botha — *Jun. 2024 – Aug. 2024*

- Developed computational tools for crystallography diffraction analysis at femtosecond timescales, specializing in protein structure determination using Python and MATLAB.
- **cxls_hitfinder**: Implemented deep learning classifier to automate experimental parameter estimation and enhance Bragg peak detection in crystallographic datasets.
- **waterbackground_subtraction**: Engineered signal processing algorithm to optimize peak detection in varying flux conditions, improving accuracy of structure determination experiments.

Publications

- Zheng, Y., Reiser, M., & **Kurth, A.** (2). (in preparation). *A Monte Carlo comparison of the efficacy of Mplus, flexMIRT, PROC IRT, ltm, and mirt in IRT models estimation.*
- **Kurth, A.** (1), Rehm, H., & Matar, M. (2025, February). *Developing natural language processing and supervised machine learning techniques to classify Mars tasks.* Poster to be presented at the NASA Human Research Program Investigator's Workshop, Galveston, TX.
- Matar, M., Rehm, H., & **Kurth, A.** (3) (2025, February). *Large language models and generative AI tools to depict human systems' contribution to spaceflight tasks execution.* Poster to be presented at the NASA Human Research Program Investigator's Workshop, Galveston, TX.
- Botha, S., Everett, E., Ketwala, G. **Kurth, A.** (1), Verlarde, A., Grant T. G., Kirian, R. (2024, October). *Data Analysis tools for the Compact X-ray Light Source and Compact X-ray Free Electron Laser facilities at ASU.* Presented at the 18th International Conferences for the crystallization of Biological Macromolecules (ICCBM).

Projects

Selected GitHub Projects

Author

- **cxls_hitfinder**: CNN model for Bragg peak detection and parameter prediction in CXFEL beam-line analysis.
- **waterbackground_subtraction**: Implemented signal processing technique for diffraction image analysis.
- **understand-astar-search**: Aimed at intuition of path-finding search algorithm.
- **understand-marching-cubes**: Demonstration of unintuitive medical imaging reconstruction algorithm.
- **understand-liver-segmentation**: Using UMAP architecture to extract organ features in DICOM files.
- **understand-neural-networks-numpy**: Focused on intuition of neural networks using NumPy on MNIST.
- **understand-jockey-logistic-sim**: Learning logistic regression through simulating horse races.
- **understand-reinforcement-learning**: PyTorch implementation of reinforcement learning of Snake game.
- **peak_gaussian_filter**: CXFEL tool for diffraction image filtering using adjustable Gaussian filters.
- **unitcell_repo**: Statistical analysis of whether unit cell volume effects on diffraction intensity after controlling for space-group variation and intensity input, used RCSB database and linear regression for analysis.

Achievements

- ***2024***: Rising Star Nomination NASA GRC, Accelerated Master's Award, John W. Luttrell Children's Network Scholarship, BioXFEL Scholar.
- ***2023***: Pediatric Cancer Research Foundation Survivor Scholarship, Coats & Todd Overcoming Disability Scholarship, Ruth Cheatham Foundation, HPFY Beyond Disability Scholarship.
- ***2022***: Burress Family Foundation Underdog Scholarship, John W. Luttrell Children's Network Scholarship.
- ***2021***: ASU Alumni Legacy Scholarship, President's List

Technical Skills & Interests

- **Statistics**: Distribution & Inference Theory, Statistical Linear Models, regression analysis, analysis of variance, causal inference, mathematical statistics, deep learning, Natural Language Processing, machine learning.
- **Mathematics**: Real Analysis/Advanced Calculus, numerical analysis, computational imaging, linear algebra, geometry, symbolic logic, calculus.
- **Programming Languages**: Python, R/RStudio, Bash, Linux/Command Line (CL), MATLAB, Java, LaTeX.
- **Technical Skills**: PyTorch, Scikit-Learn, Git/GitHub/GitLab, Sphinx/GitPages, and web development.
- **Research Interests**: Biostatistics, causal inference, medical imaging, epidemiology, epistemology, clinical decision-making, information theory, deep/machine learning.
- **Data Visualization**: ggplot2, Matplotlib, Seaborn, Plotly, Tableau
- **Soft Skills**: Public speaker and presenter in technical and non-technical settings.
- **Interests**: classical literature, analytical/continental philosophy, Emerson, fitness, meditation.

Conferences & Presentations

- **NASA Human Research Program Investigator's Workshop (IWS)** – Poster, Galveston, TX Feb. 2025
  Using Natural Language Processing AI Tools to Analyze Mars Tasks, Kurth A., Rehm H., Matar M.
- **NASA CHP-PRA Summer Student Research Discussion** – Presentation, Cleveland, OH Aug. 2024
  Using Natural Language Processing AI Tools to Analyze Mars Tasks, Kurth A., Rehm H., Matar M.
- **Biodesign Fusion Research Conference** – Poster, Phoenix, AZ Apr. 2024
  Peak Intensity Analysis for Serial Femtosecond Crystallography Experiments at CXLS, Kurth A., Botha, S.
- **BioXFEL Annual Symposium** – Poster, Tempe, AZ Feb. 2024
  Peak Intensity Analysis for Serial Femtosecond Crystallography Experiments at CXLS, Kurth A., Botha, S.

Volunteering & Community Engagement

- **Starlab ExpertLink 2024** – Talk, Virtual from AZ Oct. 2024
  Expert panelist discussing STEM careers to K-12 students in state of Ohio. Engaged with middle school students on efforts at NASA GRC for sustainability, and astronaut health. Starlab ExpertLink is education outreach collaboration with The Ohio State University.
- **AZBIO: Voice of the Patient** – Talk, Phoenix, AZ Sep. 2024
  Talk request from AZBIO discussing personal story and patient perspective for community engagement, and transplantation awareness.
- **ASU News: Math and stats grad beats the odds...** – Article, Tempe, AZ May 2024
  Discussed personal story to ASU News and discussed the university's role in overcoming challenges.
- **APHON AZ: Patient Panel** – Talk, Phoenix, AZ Apr. 2024
  Spoke at the Association of Pediatric Hematology/Oncology Nurses – AZ Chapter's annual conference on a patient panel, discussing patient perspective and personal story.
- **Donate Life Arizona**: Tempe, AZ Sep. 2022 – present
  Actively contribute to organ donation awareness and education, aligning with biostatistical interests in transplantation outcomes and healthcare ethics.
  - **Campus Challenge: ASU Diablo's Club Zero**: Aug. 2024
  - **Speaker's Workshop**: Mar. 2024
  - **Annual Fiesta Bowl Parade**
  - **Donate Life AZ 2022 Calendar Feature & Interview**
    Interview and featuring in Donate Life AZ annual calendar. Discussing personal story in interview format for community outreach for organ donation.
  - **Monthly Volunteer Meetings**
- **Children's Organ Transplant Association**: Remote/Scottsdale, AZ Apr. 2020 – present
  Community awareness for children transplantation. Fund-raising for the cost of life-long immunosuppressants and general increased medical costs.

- **2022 COTA Calendar** – Nov. 2022
  Promotion and featuring in annual calendar by discussing personal story for community engagement for transplantation awareness.
- ***The Mulligan* Golf Tournament** – May 2022
  Main contributor in planning golf tournament operations, catering and overall planning and organization. This fundraising event was to raise money for my life-long reliance on immunosuppressant medication due to transplantation. All proceeds went to COTA for Adam K.

References

Sally Morton, Mentor
Executive VP Knowledge Enterprise ASU
Phone: 480-965-4087
Email: scmorton@asu.edu

Mona Matar, Supervisor & Mentor
Research Mathematician, NASA GRC
Phone: 704-706-5350
Email: mona.matar@nasa.gov

Yi Zheng, P.I., Professor & P.I.
Associate Professor, ASU
Phone: 480-727-8523
Email: yi.isabel.zheng@asu.edu

Sabine Botha, Supervisor & P.I.
Assistant Research Professor, ASU
Phone: 602-933-0920
Email: sbotha@asu.edu