

Mohamad Daniel Bairakdar

734-747-1049 • mdanb@uw.edu

Website: mdanb.github.io • Github: github.com/mdanb

EDUCATION

University of Washington

PhD in Biostatistics, Statistical Genetics Pathway

Coursework:

- Statistical Inference || Biostatistics I || Biostatistics Seminar

Seattle, WA

Start date: September 2024

University of Michigan

B.S.E in Data Science, minor in Mathematics, *Summa Cum Laude*

GPA: 3.92 / 4.00

Relevant Coursework:

- **Statistics & Data Science:** Applied Regression Analysis || Machine Learning || Statistics and Data Analysis || Bayesian Data Analysis || Independent Study in Statistics
- **Mathematics:** Linear Algebra || Mathematical Modeling in Biology || Abstract Algebra || Probability Theory || Discrete Mathematics || Multivariable Calculus || Differential Equations || Intermediate Differential Equations i.e Nonlinear Dynamics and Chaos || Topology || Real Analysis || Fourier Analysis
- **Computer Science & Programming:** Computer Science Pragmatics || Elementary Programming Concepts || Programming and Intro Data Structures || Data Structures and Algorithms || Databases
- **Physical Sciences:** Circuit Analysis || Honors Physics III (Waves, Light, and Heat) || General Chemistry || General Chemistry Lab || Organic Chemistry
- **Biology:** Computational Biology

Ann Arbor, MI

January 2018 – December 2022

RESEARCH EXPERIENCE

Tsankov Lab, Icahn School of Medicine at Mount Sinai

Associate Computational Researcher

- Submitted manuscript as first author.
- Built machine learning models to identify the cell-of-origin of multiple cancer types using single-cell ATAC-Seq profiles of normal cells
- Subtyped patients per major TCGA/ICGC cancer type using UMAPs and hierarchical clustering to discover novel cancer subtypes and associated cell-of-origin
- Investigated the chromatin makeup of different genomic regions using Epilogos and its relationship to cancer mutational density
- Analyzed under- and over-estimated genomic regions to discover novel driver genes and super enhancer regions
- Created UMAPs of meta-cell correlation of scATAC with cancer mutational density

New York City, NY

June 2022 – August 2024

Truttmann Lab / CASI Lab

Undergraduate Researcher

- First author of [A meta-analysis of RNA-Seq studies to identify novel genes that regulate aging](#)
- Trained machine learning models to predict age-related genes in *C. elegans*
- Investigated Artificial and Graph-based Neural Network models, and traditional ML models including XGBoost, Random Forest, and Logistic Regression
- Learned how to process gene expression data using bulk RNA-seq analysis tools like Kallisto and suite of Bioconductor libraries including TxImport, EdgeR
- Conducted GSEA and traditional differential expression analysis using voom/limma
- Wrote a suite of bash scripts to quickly download and process more than 120 TB of gene expression data from NCBI databases on a local machine

Ann Arbor, MI

April 2020 – December 2022

- Acknowledged in ICLR 2021 paper [Adaptive Universal Generalized PageRank Graph Neural Network](#) for contributing a helpful correction (details [here](#))

ProjectX

Ann Arbor, MI

Undergraduate Researcher

September 2021 – February 2022

- Selected as part of the University of Michigan ProjectX Research Competition Team with 5 other team members, advised by Dr. Jonathan Gryak
- Built multi-modal, longitudinal machine learning models (LSTMs and Random Forests) for lung cancer development prediction using XRay and EHR data from the MIMIC-III dataset
- Investigated the use of different EHR data, including but not limited to ICD10/ICD9 codes, laboratory test results, patient demographics, and medications
- Improved my ability to work and stay organized in a collaborative research environment

MCubed Scholars Program

Ann Arbor, MI

Undergraduate Researcher

May 2019 – July 2019

- Researched and performed tests on deep learning code for classifying prostate cancer
- Familiarized myself with Python, Linux, the Scipy ecosystem, and deep learning concepts
- Learned to work with the U of M system for remote computing

Undergraduate Research Opportunity Program

Ann Arbor, MI

Undergraduate Researcher

September 2018 – April 2019

- Conceptualized and brain-stormed with team about ways that students can effectively make use of educational technology
- Created a simple prototype “virtual GSI” Amazon Alexa skill using Alexa SDK V2 for NodeJS to help students improve academic performance by providing them with an engaging educational voice experience
- Learned to work in a collaborative research environment by working with 5 other team members

PUBLICATIONS

1. **Bairakdar, M. D.**, Tewari, A., & Truttmann, M. C. (2023). A meta-analysis of RNA-seq studies to identify novel genes that regulate aging. *Experimental Gerontology*, 173, 112107. <https://doi.org/10.1016/j.exger.2023.112107>

MANUSCRIPTS UNDER REVIEW

2. **Bairakdar, M. D.** †, Giotti, B. †, Lee, W. †, Stancl, P., Wagenblast, E., Hambarzumyan, D., Polak, P., Karlic, R., Tsankov A. Learning the cellular origins of cancer using single-cell chromatin landscapes.

PRESENTATIONS

- “Identifying the origin of cancer at cell-type resolution by modeling the relationship between scATAC genome accessibility and the tumor mutational landscape.” Mount Sinai Cancer Biology Retreat, Bohemian National Hall, New York, NY, March 2024.

TEACHING EXPERIENCE

Science Learning Center

Ann Arbor, MI

Course Facilitator

September 2018 – December 2018

- Facilitated a study group of 15 members to improve students’ academic performance in CHEM 130 course
- Guided students’ thinking by redirecting questions to them and making them think critically about the material
- Incorporated fun activities like ice-breakers and chemistry quiz competitions using Kahoot app to help students enjoy learning

Sagesse High School

Tutor

Beirut, Lebanon

September 2017 – December 2017

- Provided personalized tutoring in International Baccalaureate (IB) Mathematics and English to two students, fostering a deeper understanding and appreciation of the subjects
- Offered hands-on assistance and guidance throughout the completion of their IB projects
- Cultivated a supportive learning environment that encouraged questions and exploration, leading to enhanced engagement and academic performance of the mentees

SKILLS

- **Proficient**
 - Programming Languages: Python, R, Bash scripting, C/C++
 - Packages, Tools, and Frameworks: PyTorch, PyTorch Geometric, Linux, Git, Docker, Apptainer, bulk RNA-seq analysis, GSEA, SciPy ecosystem, ArchR, HPC, Tidyverse
 - Languages: Arabic, English, French
- **Beginner**
 - Programming Languages: MATLAB
 - Packages, Tools, and Frameworks: PyTorch Lightning, Seurat, Harmony, Optuna, HTML5, CSS3, scRNA-seq analysis, edgeR, voom/limma, RStan

AWARDS

- **University of Michigan**
 - University Honors (x4)
 - U of M Dean's List (x5)
 - James B. Angell Scholar
- **Sagesse High School**
 - Award of Outstanding Academic Achievement
 - Awards of Excellence in Math, Physics, Chemistry, IT in a global society, French

SELF-DIRECTED LEARNING

- **Coursera**
 - Machine learning, Stanford
 - Intro to HTML5, University of Michigan
 - Intro to CSS3, University of Michigan
- **Other Courses**
 - EECS 370 (Computer Architecture), University of Michigan

INTERESTS AND HOBBIES

- **High-level scientific interests**
 - Aging research (healthspan & lifespan), The three main age-related diseases (cancer, heart disease, dementia), Machine/Statistical Learning, Scientific programming, Biostatistics, Computational Biology & Bioinformatics, Mathematical Biology, Translational research, Personalized medicine, Network medicine, Rigorous methodology
- **Low-level scientific interests**
 - Probabilistic & Generative modeling, Supervised / Unsupervised / Transfer learning, Explainable AI, Bayesian statistics, Multi-scale modeling, Longitudinal data modeling, Graph neural networks & graph-based methodology, A combined algorithms & inference approach
 - Omics & Multi-omics, Multi-modal data integration, Drug repurposing and discovery, Clinical trials, Data QC and correction, Reproducibility & clean code
- **Other interests**

- Equity in Healthcare & Education, Education reform, Safe spaces for dialogue, Inclusive environments, Creating engaging presentations, Multidisciplinary teamwork, Personalized education
- **Hobbies**
 - Reading, Working out, Recreational Sports, Climbing, Hanging out with friends, Healthy lifestyle, Self-development, Skiing, Traveling, Watching soccer, Watching Movies and TV shows, Podcasts (especially The Lex Fridman Podcast, The Drive by Peter Attia, and Farnam Street)

COMMUNITY ENGAGEMENT

Global Scholars Program

Ann Arbor, MI

Global Scholar

September 2018 – April 2019

- Selected as part of a cohort of students of over 30 nationalities to participate in GSP
- Lived in a community of global scholars, engaging in regular weekly dialogues and meetings about critical socio-economic and cultural issues, including race & ethnicity, gender, education and healthcare inequality, systemic and institutional violence, global peace, among other topics
- Participated as part of a team of 10 people in a virtual volunteering opportunity with the Bright Life Language School in Cambodia to help create educational material in English for kids in an underserved community
- Took two courses over the course of two semesters as part of the GSP, *Addressing Critical Global Issues* and *Tackling Critical Global issues*, to deepen understanding of the issues discussed outside class

University of Michigan Educational Theater Company

Beirut, Lebanon / Ann Arbor, MI

Peer Educator

June 2018 – August 2018

- Memorized lines for a 5-part theater play to help international students at UM feel supported and at home, initially rehearsing remotely from Beirut before on-site engagements in Ann Arbor
- Tackled the common struggles faced by international students living abroad, the resources at UM that they can take advantage of for different problems they may face, both physical and mental, and how to make the best of their time in Ann Arbor
- Rehearsed the play alongside 7 other team members under supervision of play director
- Performed in front of an audience of 500+ international students and their families

Shatila Refugee Camp

Beirut, Lebanon

Volunteer

July 2017 – August 2017

- Contributed a month of volunteer service at a school catering to Syrian refugee children aged 5-8 in the Shatila refugee camp
- Collaborated with two friends to bake treats such as brownies and cookies for the kids
- Engaged in painting, clay sculpting, and story reading with the kids

PROFESSIONAL EXPERIENCE

Synkers

Beirut, Lebanon

Marketing Intern

May 2018 – June 2018

- Joined Synkers, a dynamic platform bridging students with tutors akin to Uber's model, as a Marketing Intern, contributing to the company's outreach
- Spearheaded on-ground promotional campaigns at local schools and colleges, engaging directly with potential users to heighten awareness of the company

Clemenceau Medical Center

Beirut, Lebanon

Observational Intern

June 2018 – July 2018

- Shadowed a team of healthcare professionals for a month, gaining insights into patient care, medical procedures, and the day-to-day operations of a busy urban hospital

Chocolate Bar

Beirut, Lebanon

Waiter

June 2016 – August 2016 & September 2017 – December 2017

- Served food and drinks to customers at a chocolate cafe (crepes, waffles, ice cream, etc...)
- Entrusted with the management of the cafe's top floor, effectively coordinating service to ensure timely assistance and a satisfying experience for customers
- Maintained a welcoming and clean environment through diligent preparation and tidying of tables