Jahanbakhsh Ghasemi
Second-year Ph.D. Student | Computer Science & Engineering | University of Connecticut

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GitHub: https://github.com/zanax1990 | Storrs, CT

Overview

- Second-year Ph.D. student in Computer Science & Engineering at UConn, experienced in applied machine learning and deep learning for various topics including biomechanics and biomedical imaging.

- Experienced in Python for data cleaning, preprocessing, modeling, and evaluation on biomechanics datasets, DIA LC–MS/MS proteomics analyses, and GPU-based single-cell microscopy workflows. Familiar with R for proteomics-focused statistical analysis.

- Collaborated with Dr. Chaudhuri's lab to develop Python tools for automated HPC job submission and post-processing of molecular dynamics simulations for gene therapy projects, including magnesium ion localization, charge distribution analysis, and quantification of ice formation across trajectories.

- Active collaborator across multiple UConn Health labs, working with Dr. Cato T. Laurencin and Dr. Kristin Morgan on machine learning models for knee joint force prediction, contributing to probabilistic single-cell segmentation in Dr. Ji Yu's lab, and analyzing DIA LC–MS/MS proteomics data with Dr. Royce Mohan's team, contributing to two research manuscripts in preparation and under review. Also serving as first author on a comprehensive machine learning review in gait biomechanics with Dr. Laurencin and Dr. Morgan.

- Experienced in statistical modeling and geospatial analysis for health and urban datasets, integrating regression, PCA/NCA, and GIS-based analytics into reproducible Python and R workflows.

- Experienced running large experimental sweeps on UConn CAM/Mantis HPC clusters using SLURM and managed Python environments, and organizing outputs into reproducible, manuscript-ready figures, tables, and CSV files.

- Outstanding academic standing with a GPA of 3.78 and a successfully passed Qualifying Exam.

- Authored one second author published research article and three first author additional manuscripts currently under peer review.

Core Skills

- Programming & Analysis: Computational Methods & Programming: Python (pandas, NumPy, scikit-learn, PyTorch, matplotlib), R (tidyverse, data.table, ggplot2, sf), MATLAB, Bash; experienced with workflow automation and reproducible pipelines.
- High-Performance Computing: Regular use of UConn CAM/Mantis clusters, SLURM job scheduling, environment management (conda/venv), large-scale batch experiments for biomedical imaging.
- Machine Learning & Deep Learning: Supervised learning (regression, SVM, tree-based ensembles), U-Net-based and probabilistic segmentation models, and rigorous evaluation using metrics such as Precision, Recall, F1, Dice, and AP.
- Statistical Analysis: Linear and generalized linear models, correlation analysis, normalization strategies, hypothesis testing, and interpretation of results in biomedical and biomechanical datasets
- Data Engineering & Management: Handling multi-GB datasets, long↔wide restructuring, per-sample and per-condition normalization, and versioned analysis workflows.
- Visualization & Spatial Analytics: Design of publication-quality figures, comparative bar plots, heatmaps, enrichment plots, Dashboard app and geospatial analysis using ArcGIS, QGIS, and R sf for health and policy applications.

Software Projects

MohanOmics Analyzer
GitHub: https://github.com/zanax1990/MohanOmics
Python, Streamlit, Pandas, NumPy, Plotly

- Built an end-to-end interactive data analysis app for proteomics datasets.
- Implemented PCA, normalization, enrichment analysis (GProfiler), and dynamic visualizations.
- Designed modular, reproducible pipelines for biological research workflows.

CrimeLightingApp
GitHub: https://github.com/zanax1990/CrimeLightingApp
Python, Tkinter, Matplotlib, Pandas

- Developed a desktop GUI to analyze crime reduction before and after street-lighting interventions.
- Added CSV/Excel ingestion, basic validation, and automated visualization of before/after crime data.
- Supported comparing multiple locations in a single session with side-by-side charts.

Work Experience

Graduate Research Assistant – Dr. Royce Mohan's Lab (UConn health) *(Spring 2025)*

https://github.com/zanax1990

- Analyzed DIA LC–MS/MS proteomics data using msDiaLogue and custom R pipelines (QC filtering, imputation, median-centering, $\log_2$ transforms) for corneal nerve injury studies.
- Performed differential expression with limma, along with PCA, clustering, and pathway enrichment analysis.
- Generated reproducible CSV outputs, volcano plots, PCA maps, and enrichment visualizations.

Graduate Research Assistant – Dr. Ji Yu's Lab (Microscopy & Probabilistic Segmentation, UConn health), (*Spring 2025)*

https://github.com/jiyuuchc/ctxseg

- Reproduced deterministic segmentation baselines and built a validated evaluation pipeline (Precision, Recall, F1, Dice, AP).
- Processed microscopy movies, designed frame-selection strategies, and curated analysis-ready subsets.
- Ran and debugged large segmentation experiments on CAM/Mantis HPC clusters (CPU/GPU) and developed probabilistic workflows that add diversity without sacrificing baseline accuracy.
- Automated metric aggregation and multi-panel figures for model comparison and manuscript milestones.

Graduate Research Assistant – Cato T. Laurencin and Kristin Morgan's Labs (Biomechanical ML, UConn) *(2024 – 2025)*

- Built ML models (Regression, SVR, Decision Tree, Random Forest, MLP) to predict knee joint and muscle forces.
- Applied PCA / NCA for feature reduction; evaluated RMSE, MAE, R^2 across multi-subject datasets.
- Automated visualization and report generation for model performance.

Graduate Research Assistant – Bradford's Lab (Dynamic Microservices, UConn) *(2024 – 2025)*

- Authored a survey on dynamic circuit breakers for microservice-based financial systems, focusing on Auto-Retry Circuit Breakers (ARCB), Elastic Circuit De-Constructors (ECD), predictive state-transition models, and Markov-based dynamic fault tolerance.

- Contributed to structuring the circuit breaker pattern taxonomy, formalizing state parameters and transitions, and writing specifications for ARCB and ECD, including their resilience trade-offs and deployment use cases

Publications

(https://scholar.google.com/citations?user=ZIbOTAgAAAAJ&hl=en&oi=ao)

In press

1. Sharifi L**, Ghasemi J**, Duran T, Naik S, DiLuzio W, Sharifi A, Chanda A, Chaudhuri B. *Impact of Salt on AAV8 Capsid Aggregation with Single-Stranded DNA: Insights from Coarse-Grained Molecular Dynamics Simulations.* Int J Pharm. 2025;681:125867.

Under review

2. **Ghasemi J**, Morgan K, Rajasekaran S, and Laurencin C**,** *Machine Learning for Gait Analysis in Rehabilitation: A Scoping Review of Models, Modalities, and Clinical Applications, npj Digital Medicine*
3. **Ghasemi J**, Morgan K, Rajasekaran S, and Laurencin C**,** *Toward Real-Time Knee Joint Force Prediction via Machine Learning: Outpacing Traditional Simulations, Review Nature bioengineering*
4. **Ghasemi J**, Bradford P. *Survey of Dynamic Circuit Breakers for Resilient Microservices, CMOC journal.*