

Jinqiu Du (Turbo)

206-370-4374 | turbodu@uw.edu

EDUCATION

University of Washington

Seattle, WA

M.S in Biostatistics – Modeling and Methods Track

Sep. 2024 - May. 2026 (Expected)

- Total GPA: 3.83/ 4.00 (Ranked 1st in the cohort)

- Coursework: Statistical Inference, Theory of Linear Model, Advanced Regression Methods

Hong Kong Baptist University

Hong Kong

B.S (Honors) in Statistics (First Class), Minor in Computer Science and Technology

Sep. 2020 - Jun. 2024

- Total GPA: 3.61/ 4.00; Major GPA: 3.79/4.00, Minor GPA: 3.85/4.00

- Coursework: Advanced Statistics, Stochastic Process, Multivariate Analysis, Bayesian Statistics, Time Series Analysis, Machine Learning, Experimental Design, Optimization, Simulation, Regression Analysis, Probability

PUBLICATIONS

- [1] **J. Du** and K. Z. Lin, “Integrating Morphology and Gene Expression in Unpaired Single-Cell Data using GeoAdVAE,” under review at *Research in Computational Molecular Biology (RECOMB)*, preprint, 2025.
- [2] W. T. Zhang, **J. Du**, Y. Chen, S. Jayadev, K. E. Prater, and K. Z. Lin, “Large-scale snRNA-seq meta-analysis of microglia role in Alzheimer’s disease across statistical methods,” preprint, 2025.
- [3] S. Liu, **J. Du**, Y. Zheng, J. Yin, Y. Deng, and J. Wu, “Holistic Optimization in UAV-Assisted Fog Computing: Attitude, Trajectory, Task Assignment,” under revision for *IEEE Transactions on Vehicular Technology*, arXiv:2407.14894.
- [4] S. Liu, J. Yin, **J. Du**, Y. Zheng, Y. Deng, and J. Wu, “Meteorological and Topographical Big Data-Driven UAV Trajectory Planning,” *Proceedings of the 34th International Telecommunication Networks and Applications Conference (ITNAC)*, Sydney, Australia, 2024, pp. 1–6. doi:[10.1109/ITNAC62915.2024.10815424].
- [5] **J. Du**, Y. Zheng, S. Liu, J. Luo, J. Yin, Y. Deng, and J. Wu, “Optimizing Vaccine and Ventilator Allocation to Minimize Health Risks and Costs During Pandemics,” under review, *Health Care Management Science*.

RESEARCH EXPERIENCE

Integrating Single-Cell Morphology and Gene Expression for Cross-Modal Analysis

Seattle, WA

First-author, Supervised by Prof. Kevin Z. Lin, University of Washington

Jan. 2025 - Present

- Developed GeoAdVAE, a PyTorch-based geometry-aware adversarial autoencoder integrating neural cell morphology and transcriptomics via a novel multi-objective loss fusing adversarial network and Gromov–Wasserstein alignment.
- Designed the first known biologically interpretable simulation linking gene expression to neuronal morphology, providing insightful visualizations of pyramidal, bipolar, and multipolar neuron structures.
- Validated the model on real paired Patch-seq and simulated data under an unpaired integration setting, where our framework achieved an average ~20% higher cell-type alignment accuracy compared to 11 benchmark methods.
- Integrated unpaired morphology and transcriptomic data from distinct cohorts in Alzheimer’s dataset and performed cross-modal inference in the shared latent space, discovering morphology-linked genes associated with Alzheimer’s pathology.

* Presented research findings as a poster at the 2025 American Society of Human Genetics (ASHG) in Boston.

STPath – Spatial Transcriptomics-Guided Deep Learning for Pathology Image Analysis

Seattle, WA

Research Assistant, Supervised by Prof. Wei Sun, Fred Hutch Cancer Center

Feb. 2025 – Present

- Developed an end-to-end pipeline integrating single-cell RNA-seq, spatial transcriptomics, and histopathology image features to identify spatial cell-type distributions in lung cancer.
- Proposed a modified CARD R package enabling custom differentially expressed genes (DEGs) for cell-type deconvolution.
- Extracted latent representations from multiple vision foundation models (CONCH, ProvGigapath, Virchow, UNI2h, etc.) to learn high-dimensional feature embeddings from histopathology slide images.
- Leveraged XGBoost in Python to infer cell-type composition from histology-derived embeddings, reaching a Pearson correlation of ~0.7 on held-out test samples.

Cohort-level differential distributional analysis for studying microglia in Alzheimer’s disease via single-nuclei RNA-sequencing

Seattle, WA

Co-author, Collaborated with Prof. Kevin Z. Lin & UW Neuroscience

Sep. 2024 – Jun. 2025

- Designed and implemented a distribution-based framework (Was2CoDE) for identifying cohort-level shifts in microglial gene expression using single-nuclei RNA-seq data from Alzheimer’s disease patients.
- Developed nonparametric Wasserstein-based metrics to quantify transcriptomic distributional differences beyond mean-level changes, capturing disease-specific heterogeneity missed by traditional DE analysis.

- Built a reproducible Python pipeline for data preprocessing, statistical modeling, and visualization, benchmarked against classical DE methods, achieving a ~25% increase in sensitivity for detecting subtype-specific microglial activation patterns.

Modeling Abnormal Ambulatory Blood Pressure (ABPM) and Kidney Function Progression **Seattle, WA**

Research Assistant, Collaborated with Prof. Sangeeta R Hingorani, Seattel Children's Hospital Jul. 2025 – Sep. 2025

- Led two pediatric nephrology studies on nocturnal blood pressure variability and renal function in solitary kidney.
- Proposed an adaptive Cox modeling framework with time-dependent covariate updating to address irregular follow-up and informative censoring, improving dynamic risk estimation of daytime hypertension in pediatric cohorts.
- Developed a novel REML-imputation hybrid mixed model to jointly address missing at random (MAR) data and within-subject correlation, enabling robust estimation of complex nonlinear eGFR trajectories over time.

* Both are presented at UWSOM's Seattle Poster Symposium and submitted to the 2026 Western Medical Research Conference.

RELATED RESEARCH EXPERIENCE

Optimization of Healthcare Recourse Allocation During the COVID-19 Pandemic **Guangdong, China**

First-author, Supervised by Prof. Jingjin Wu & Prof. Yuhui Deng Jan. 2023 – Dec. 2024

- Developed a novel optimization framework integrating an extended SVUIR epidemiological model with a linearized mixed-integer programming (MIP) formulation to jointly allocate vaccines and ventilators under dynamic outbreak conditions.
- Implemented and refined the mathematical model using real COVID-19 data, linearizing nonlinear constraints via Big-M methods, and achieved >60% higher computational efficiency and up to 70% cost reduction versus baseline strategies.
- Applied the framework to generate optimized allocation plans across 17 age groups and 5 regions over a 400-day horizon during the COVID-19 pandemic.

Analysis and Optimization of UAV Energy Consumption for Fog Computing **Guangdong, China**

Project Director, Supervised by Prof. Jingjin Wu & Prof. Yuhui Deng Jun. 2022 – Jan. 2025

- Developed an adaptive control algorithm to ensure UAV flight stability under dynamic weather and terrain conditions.
- Proposed an improved ant colony optimization algorithm for UAV 3D trajectory planning and computing task assignment, achieving faster convergence and avoiding local optima.
- Integrated real-world meteorological and terrain data into risk simulations, improving crash prediction accuracy.
- Utilized a holistic optimization framework to enable optimal UAV task allocation under energy-efficient flight paths, achieving a $\geq 34\%$ gain in energy efficiency and $2.6\times$ higher task completion rate over baselines.

* The project received individual funding support from the Provincial Government's "Climbing Plan" special fund.

TEACHING & INTERNSHIP EXPERIENCE

Teaching Assistant, BIOST 310: Biostatistics for the Health Sciences **Seattle, WA**

Department of Biostatistics, University of Washington Sep. 2025 - Present

- Led 2-hour discussions session per week, held office hours, and graded coursework for ~200 students.

Tutor in Statistics, Statistics Study Center **Seattle, WA**

Department of Statistics, University of Washington Sep. 2024 - Present

- Assisted ~30 undergraduate students weekly in statistical coursework and R programming during 4-hour tutoring sessions.

Volunteer Contributor, BIOST 545: Biostatistical Methods for Big Omics Data **Seattle, WA**

Department of Biostatistics, University of Washington May. 2025 - Aug. 2025

- Built course website with R (Quarto framework) to present lecture materials and reproducible code examples.

National Bureau of Statistics of China **Chengdu, China**

Modeling Assistant, Agricultural Survey Division May. 2023 – Aug. 2023

- Built regression models from remote sensing data to estimate rural land use and visualized output for a 50-page official atlas.
- Leveraged ARIMA for trend analysis and LSTM for forecasting liquor PMI, creating quantitative metrics for Q3 dashboards.

HONORS & AWARDS

Finalist, COMAP Mathematical Contest in Modeling (MCM), Top 1% Worldwide 2022

Meritorious Winner, COMAP Mathematical Contest in Modeling (MCM), Top 6% Worldwide 2023

First-Class Academic Scholarship, Hong Kong Baptist University, Top 5% 2022-2023

Student Internship Scholarship, Hong Kong Baptist University 2021

PROGRAMMING SKILLS

Python, R, Linux, C, Java, MATLAB, LaTeX, Git, SQL, SPSS, Lingo, Excel