

Wei Zhang

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RESEARCH INTERESTS

Multi-omics Integration, Machine Learning, Deep Learning, Random Forests, Variable Selection, Meta-analysis, Biomarker Detection, Subtype Clustering, Statistical Genomics, Epigenetics, Neurodegenerative Disease and Cancers


RESEARCH EXPERIENCE

University of Miami <i>Postdoctoral Associate</i>	<i>Miami, FL</i> Sep 2024 - Present
<ul style="list-style-type: none">◦ Develop and implement advanced computational and machine learning methods for the analysis of large-scale omics data◦ Conduct computational analyses to identify biomarkers and therapeutic targets using multi-omics data integration◦ Develop and apply machine learning models for predictive analytics in biomedical research◦ Maintain and optimize computational clusters and cloud computing environments to support large-scale data analysis	
<i>Graduate Research Assistant</i>	May 2022 - Aug 2024
<ul style="list-style-type: none">◦ Collaborated with a diverse team to research and analyze genomic data for association studies, biomarker discoveries, and disease predictions in late-onset Alzheimer's Disease, triple-negative breast cancer, and colorectal cancer◦ Published multiple research papers contributing to the field of biomarker detection and disease prediction◦ Supported in drafting and editing grant proposals, ensuring clarity and alignment with project objectives	

EDUCATION

University of Miami <i>Ph.D. in Biostatistics Advisor: Chen, X. Steven, Ph.D.</i>	<i>Miami, FL</i> Aug 2024
<ul style="list-style-type: none">◦ Dissertation: Integrative Multi-Omics Analysis Using Multivariate Random Forest	
The George Washington University <i>M.S. in Statistics</i>	<i>Washington, DC</i> May 2019
State University of New York at Binghamton <i>B.S. in Economics Analysis & Actuarial Math</i>	<i>Binghamton, NY</i> May 2017

PROJECTS

Multivariate Random Forest Framework for Multi-omics Data Integration <i>Tools: R, Random Forest, method development</i>	<i>Ongoing</i>
<ul style="list-style-type: none">◦ Developed a random forest-based method for integrating multi-omics datasets, which improves predictive accuracy compared to single-omics analyses significantly.◦ Demonstrated that the proposed method outperforms established integrative techniques in uncovering biologically meaningful biomarkers and pathways through simulations and TCGA data analysis.◦ Created comprehensive documentation and methodology pipelines, ensuring replicability of translational research applications.◦ Ongoing work in developing multi-omics integration for disease subtyping and data imputation.◦ Github Repositories:<ul style="list-style-type: none">*  An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery	
Tumor and CellLine Transcriptomes Alignment with Deep Neural Networks <i>Tools: Python, Pytorch, Variational Autoencoder (VAE)</i>	<i>Ongoing</i>
<ul style="list-style-type: none">◦ Develop a deep learning framework integrating Variational Autoencoders and domain-adversarial training to align tumor and cell-line transcriptomic profiles.◦ Improve alignment of tumor and cell-line transcriptomic datasets by projecting them into a common latent space and correcting for systematic, data-specific biases.	
Epigenetic Biomarkers for Alzheimers and Cognitive Health <i>Tools: R, statistical modeling, longitudinal cohort analysis</i>	2023 - 2025
<ul style="list-style-type: none">◦ Identified and validated blood-based DNA methylation signatures predictive of incident dementia in longitudinal cohorts.◦ Evaluated reliability of the Illumina MethylationEPIC v1.0 platform for robust epigenomic measurements.◦ Discovered distinct cerebrospinal fluid biomarker-associated methylation profiles from Alzheimers patients and cognitively normal subjects.	

- Collaborated on statistical methodology development and comprehensive data analyses to advance cognitive resilience research.
 - Github Repositories:
 - * [Blood DNA Methylation Signature for Incident Dementia: Evidence from Longitudinal Cohorts](#)
 - * [DNA Methylation Signature of a Lifestyle-based Resilience Index for Cognitive Health](#)
 - * [Critical Evaluation of the Reliability of DNA Methylation Probes on the Illumina MethylationEPIC v1.0 BeadChip Microarrays](#)
 - * [Distinct CSF biomarker-associated DNA methylation in Alzheimer's disease and cognitively normal subjects](#)
- **Prediction Models for Cancer Biomarkers** 2023 - 2024
Tools: R, WGCNA, meta-analysis
- Developed transcriptome-based prediction models for chemotherapy response using matched colorectal tumor-organoid gene expression data.
 - Implemented network-based biomarker selection methods to enhance prediction accuracy in oncology studies.
 - Performed a meta-analysis on triple-negative breast cancer datasets to identify robust gene signatures linked to neoadjuvant chemotherapy outcomes.
 - Github Repositories:
 - * [Enhancing Chemotherapy Response Prediction via Matched Colorectal Tumor-Organoid Gene Expression Analysis and Network-Based Biomarker Selection](#)
 - * [Transcriptome Meta-Analysis of Triple-Negative Breast Cancer Response to Neoadjuvant Chemotherapy](#)

PUBLICATIONS AND PREPRINTS

J=JOURNAL, S=IN SUBMISSION, T=THESIS

- [S.1] **Zhang W**, Lukacsovich D, Young JI, Gomez L, Schmidt MA, Kunkle B, Chen XS, Martin ER, Wang L. (2025). **The Aging Epigenome: Integrative Analyses Reveal Functional Overlap with Alzheimers Disease**. Prepare for submission. Preprint available at [medRxiv](#).
- [J.1] **Zhang W**, Lukacsovich D, Young JI, Gomez L, Schmidt MA, Martin ER, Kunkle BW, Chen X, OShea DM, Galvin JE, Wang L. (2025). **DNA Methylation Signature of a Lifestyle-based Resilience Index for Cognitive Health**. *Alzheimer's Research & Therapy*, 17, 88. [Impact Factor: 7.9]
- [J.2] **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Kunkle B, Chen XS, Martin ER, Wang L. (2025). **Blood DNA methylation signature for incident dementia: Evidence from longitudinal cohorts**. *Alzheimer's & Dementia*, 21:e14496. [Impact Factor: 13.0]
- [J.3] **Zhang W**, Wu C, Huang H, Bleu P, Zambare W, Alvarez J, Wang L, Paty PB, Romesser PB, Smith JJ, Chen XS. (2025). **Enhancing chemotherapy response prediction via matched colorectal tumor-organoid gene expression analysis and network-based biomarker selection**. *Translational Oncology*, 52:102238. [Impact Factor: 4.5]
- [S.2] **Zhang W**, Huang H, Wang L, Lehmann BD, Chen XS. (2025). **An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery**. Revision submitted for publication in *GigaScience*. Preprint available at [bioRxiv](#).
- [S.3] Chen XS, Lukacsovich D, Zambare W, Wu C, Huang H, **Zhang W**, Kim MJ, et al. (2025). **Integrating Tumor and Organoid DNA Methylation Profiles Reveals Robust Predictors of Chemotherapy Response in Rectal Cancer**. Preprint available at [medRxiv](#).
- [T.1] **Zhang W**. (2024). **Integrative Multi-Omics Analysis using Multivariate Random Forest**. PhD Thesis, University of Miami.
- [J.4] **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Varma A, Chen XS, Kunkle B, Martin ER, Wang L. (2024). **Critical evaluation of the reliability of DNA methylation probes on the Illumina MethylationEPIC v1.0 BeadChip microarrays**. *Epigenetics*, 19(1):2333660. [Impact Factor: 2.9]
- [J.5] Lukacsovich D, O'Shea D, Huang H, **Zhang W**, Young JI, Chen XS, et al. (2024). **MIAMI-AD: An integrative knowledgebase facilitating exploration of DNA methylation across sex, aging, and Alzheimers disease**. *Database*, 2024, baee061. [Impact Factor: 3.4]
- [J.6] **Zhang W**, Young JI, Gomez L, Schmidt MA, Lukacsovich D, Varma A, Chen XS, Martin ER, Wang L. (2023). **Distinct CSF biomarker-associated DNA methylation in Alzheimer's disease and cognitively normal subjects**. *Alzheimer's Research & Therapy*, 15:78. [Impact Factor: 7.9]
- [J.7] **Zhang W**, Li E, Wang L, Lehmann BD, Chen XS. (2023). **Transcriptome meta-analysis of triple-negative breast cancer response to neoadjuvant chemotherapy**. *Cancers*, 15(8):2194. [Impact Factor: 4.5]
- [J.8] Silva TC, **Zhang W**, Young JI, Gomez L, Schmidt MA, Varma A, Chen XS, Wang L. (2022). **Distinct sex-specific DNA methylation differences in Alzheimers disease**. *Alzheimer's Research & Therapy*, 14(1), 121. [Impact Factor: 7.9]

PRESENTATIONS AND POSTERS

O=ORAL, P=POSTER

- [O.1] **An Integrative Multi-Omics Random Forest Framework for Robust Biomarker Discovery**, *STATGEN: Conference on Statistics in Genomics and Genetics*. May 2025. Minneapolis, MN, USA. Contributed Talk.
- [P.1] **An X chromosome-wide DNA methylation study of Alzheimers disease**, *Alzheimer's Association International Conference (AAIC)*. Jul 2024. Poster.
- [O.2] **Unlocking the potential of multi-omics data integration using multivariate random forest approach**, *International Biometric Society Eastern North American Region (ENAR) Annual Meeting*. Mar 2024. Baltimore, MD, USA. Contributed Talk.

[P2] **Distinct CSF biomarker-associated DNA methylation in Alzheimer’s disease and cognitively normal subjects**, *Alzheimer’s Association International Conference (AAIC)*. Jul 2023. Poster.

[P3] **Iterative Multivariate Random Forest for Feature Selection in Integrating Multi-Omics Datasets**, *Annual American Statistical Association (ASA) Florida Chapter Meeting*. Mar 2023. Gainesville, FL, USA. Poster.

TEACHING EXPERIENCE

TEACHING ASSISTANT

- **EPH705 Advanced Statistical Methods** 2022 - 2024
Professor: Wang, Lily, Ph.D. | University of Miami
- **STAT6201 Applied Linear Models** 2018
Professor: Barut, Emre, Ph.D. | The George Washington University

PROFESSIONAL DEVELOPMENT

WORKSHOPS

- **Duke Electronic Health Records Study Design Workshop** Dec 2024
Duke University
- **Code Rigor and Reproducibility with R Boot Camp** July 2023
Columbia University

SKILLS

- **Proficient in R/Rstudio and Python** for package building, data analysis, and visualization
- **Comprehensive skills in SAS** for various statistical applications
- **Familiar with Linux** in system and command

HONORS AND AWARDS

- Award of Academic Merit** Aug 2024
University of Miami
- Student Competition Award** March 2023
ASA Florida Chapter Meeting 
 - Best student poster
- Travel Award** Mar 2023
University of Miami

PROFESSIONAL SERVICES AND ACTIVITIES

- Manuscript Peer Review**
Manuscript Reviewer
 - Nature Communication; Scientific Reports; Discover Applied Sciences; Biology Direct; Discover Oncology; Medicine in Omics
- Membership**
Member
 - International Biometric Society (ENAR)
 - American Statistical Association (ASA)
 - International Society to Advance Alzheimer’s Research and Treatment (ISTAART)

ADDITIONAL INFORMATION

Languages: English (Proficiency level), Mandarin (Native Speaker), Cantonese (Proficiency level)
Interests: Tennis