Wenjia (Beth) Tian

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EDUCATION:

Duke University GPA: 3.828 *Durham, NC*

Master of Engineering in Risk Engineering, Sep. 2024 – Present

Research focus: flooding mitigation assessment, community resilience, flood risk modeling

Macau University of Science and Technology GPA: 3.87 *Macau*

Bachelor of Business Administration (Business Analytics), Sep. 2020 – Jun. 2024

Academic focus: Data analytics, with training in statistical modeling, machine learning, time-series modeling, and data-driven decision-making

RESEARCH SKILLS

Programming and Data Science: Python | R | C++ | SQL | VBA | Git | Jupyter | Google Colab

Quantitative and Analytical Methods: Quantitative and data-driven modeling | Statistical analysis | Time-series modeling | Econometrics | Machine Learning

HONORS & AWARDS:

- Dean's List, Macau University of Science and Technology (2021–2023)
- Outstanding Scholarship, Macau University of Science and Technology (2021–2023)
- Bank of China Scholarship (2022)
- NC Water Resources Research Institute *Mountains to Sea Graduate Research Fellowship* (under review, submitted Nov. 17, 2025)

RESEARCH EXPERIENCE:

CIRCAD Pre-Proposal: Evaluating Climate-Resilient Roof Retrofits across Coastal North Carolina *Duke University*

Pre-proposal under development for the NSF CIRCAD Center Nov. 2025 – Present

- Developing initial workflow designs linking wind hazard modeling, structural vulnerability functions, and economic damage estimation to evaluate the IBHS FORTIFIED roof mitigation program using ROI analysis
  - Aim 1: Integrate hazard, exposure, and vulnerability data to estimate baseline wind damage and model avoided losses from roof retrofits
  - Aim 2: Evaluate the cost-effectiveness and spatial distribution of resilience benefits across coastal counties to inform risk-based mitigation and insurance decisions

Adapting to Risk Rating 2.0: Community Resilience and the CRS Experience in North Carolina *Duke University*

Proposed Research Project (Funding Application Submitted) Sep. 2025 – Present

- Designed an independent mixed-methods study to examine how FEMA's Risk Rating 2.0 (RR2.0) influences community participation and resilience within the Community Rating System (CRS)
  - Aim 1: Quantify how RR2.0 affects community engagement in the CRS using statistical analysis
  - Aim 2: Identify descriptive patterns in community experiences with resilience through survey data, complemented by qualitative interviews exploring institutional barriers and adaptation strategies

Complexity and Dynamics in FEMA's Community Rating System *Duke University*

Co-author, Manuscript in Preparation Jun. 2025 – Present

- Conducted institutional and policy analysis to evaluate how structural, administrative, and dynamic complexities affect community participation in FEMA's CRS program
- Contributed to developing a conceptual framework integrating program design, administrative burden, and policy adaptation to explain persistent low participation

Drivers in Flood Insurance Gaps in North Carolina *Duke University*

Under the supervision of Prof. Mark Borsuk Mar. 2025 – Present

- Conducted a quantitative study analyzing the drivers of flood insurance gaps across counties in North Carolina
- Constructed a comprehensive multi-source dataset integrating resilience, socioeconomic, hazard, and insurance indicators to analyze community-level risk structures and market dynamics
- Applied exploratory factor analysis (EFA) and quantile regression (QR) to identify patterns of premium variation and policy non-renewals, examining how risk exposure and vulnerability shape insurance performance
- Authored the analytical report *"Drivers in Flood Insurance Gaps in North Carolina"* (Nov. 2025), providing evidence-based insights into insurance market inequities and policy implications

Predicting Financial Bankruptcy Risk *Macau University of Science and Technology*

Under the supervision of Prof. Ligang Zhou Jun. 2022 – Sept. 2022

- Assisted in a large-scale predictive modeling project on corporate bankruptcy risk, focusing on data acquisition and preprocessing
- Collected and compiled financial statements from SEC EDGAR and Bloomberg via automated API queries, building a longitudinal dataset of 5,000+ filings across three decades
- Extracted and standardized over 2,000 financial indicators through text-based field mapping and cleaning to generate a consistent, analysis-ready dataset
- Conducted preliminary exploratory analysis and feature validation to support subsequent machine learning modeling of firm-level financial vulnerability

Capstone Project: Temperature Forecasting of Compressors *Macau University of Science and Technology*
Under the supervision of Prof. Honghao Zhao Jan. 2024 – Apr. 2024

- Developed a multi-step temperature forecasting model for compressors using deep learning techniques.
- Employed Variational Mode Decomposition (VMD) and Fast Fourier Transform (FFT) for feature extraction and noise reduction, combined with Long Short-Term Memory (LSTM) networks for time-series prediction
- Conducted performance evaluation on multiple benchmark datasets, achieving superior predictive accuracy with the lowest MAE and best MSE, RMSE, and R^2 scores on the ETTh2 dataset
- Completed a written thesis summarizing methodological design, model comparison, and result interpretation as part of the graduation requirement

PUBLICATIONS & MANUSCRIPTS:

- Tian, W., Zarei, M., Ferris, W., Borsuk, M., & Landry, C. (in preparation). *Too Complex to Succeed? Structural, Administrative, and Dynamic Barriers in FEMA's Community Rating System.*

PROFESSIONAL EXPERIENCE:

Large Language Model Development *Hefei Songsu Technology Co., Ltd., Hefei, China*
Research Assistant May 2024 – Sep. 2024

- Conducted an in-depth literature review on large language model (LLM) architectures with a focus on data generation, alignment mechanisms, and evaluation frameworks
- Synthesized mainstream approaches and comparative analyses of open-source and commercial LLMs to inform the design of research-oriented data systems
- Examined training data composition and preprocessing pipelines to enhance the company's synthetic data generation methodology
- Collaborated with technical teams to translate academic findings into scalable strategies for data management and model assessment

Business Analytics Intern *Nam Kwong (Group) Company Limited, Macau*
Intern Dec. 2022 – Sep. 2023

- Implemented time-series forecasting models to estimate annual procurement budgets and resource allocations
- Conducted quantitative analyses and contributed to the company's digital transformation through data integration workflows
- Supported the development of data-driven dashboards for procurement and contract management, improving decision efficiency and transparency

LEADERSHIP & OUTREACH:

Macau Women in Tech (WIT) *Macau Board Member and Event Coordinator*
Oct. 2023 – Oct. 2024

- Led planning, outreach, and evaluation for WIT's programs aimed at advancing women's participation in STEM and technology sectors
- Organized networking and mentoring sessions connecting over 50 women students and professionals across technology-related fields
- Coordinated thematic workshops on business analytics, AI, and emerging technologies to promote interdisciplinary collaboration and knowledge exchange
- Strengthened community engagement by fostering dialogue on innovation, diversity, and future career pathways for women in STEM

PEER Community Exploration & Summer Program *Yuanling, China*
Group Leader Apr. 2021 – Aug. 2021

- Designed and led a community-based summer program in a rural township, coordinating curriculum development, teacher assignments, classroom logistics, outdoor activities, and transportation for 120 high school students
- Led a community-engaged research project on aging and social vulnerability, guiding students to conduct interviews with elderly residents and identify key challenges in local eldercare systems

- Facilitated analysis of community needs related to aging reforms, mental health in older adults, and home-based care models, helping students translate field observations into structured findings

REFERENCES:

Mark E. Borsuk, Ph.D. James L. and Elizabeth M. Vincent Professor of Civil and Environmental Engineering
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