孔维康
WEIKANG KONG

Tongji University, 1239 Siping Road, Shanghai, China
+86-18516145382, kongweikang@tongji.edu.cn
Personal website: https://kwk1001.github.io

EDUCATION

Tongji University

Bachelor of Engineering in Urban Planning (Cross-disciplinary Pilot Class) Expected, June 2025

- Overall (Major) GPA: 4.58(4.70)/5.0 (Major) Average Score: 90.8(92.0)/100

Honor Course Program in Mathematics September 2020 – July 2022

- Courses: Mathematical Analysis, Advanced Algebra and Analytic Geometry, Complex Analysis, Probability Theory and Mathematical Statistics, Ordinary Differential Equations, Mathematical Modeling

Massachusetts Institute of Technology, IDSS (Institute for Data, Systems, and Society)

MicroMasters Program in Statistics and Data Science May 2023 – May 2024

- Capstone Exam Score: 90.0% (A) Course Average Score: 98.5% Certification Transcript
- Courses: Machine Learning with Python, Data Analysis, Fundamentals of Statistics, Probability

RESEARCH EXPERIENCE

Use Behavior of Mobility Scooter Users: A Case Study in Shanghai, China (in progress)

Supervisor: Prof. Mi Diao | Tongji University December 2023 – Present

Mobility scooters, designed originally for the disabled and now popular among the elderly in China, are facing bans due to rising safety concerns. The research investigated its users' characteristics and travel patterns, and evaluated the potential impact of prohibition, to provide more inclusive policy suggestions. The paper is intended for submission to Transportation Research Part A or D.

- Lead the research team in the full research process, including conceptualizing, designing methodology, collecting and analyzing data, and writing papers.
- Design and lead extensive interview surveys (400+ participants), coordinating a team of over 20 people to gather data on demographic attributes, travel behaviors, policy perceptions, etc., in Shanghai to identify factors influencing purchasing decisions.
- Develop quantitative methods to analyze the travel behavior and activity spaces of mobility scooter users, revealing their value for elderly users, including reductions in travel costs and improvements in accessibility.
- Draft evidence-based suggestions for transport and planning policy, ensuring the right to mobility for mobility scooter users while addressing accessibility, affordability, and safety.

Modeling Heat Island Effects with Novel 3D Urban Form Metrics and Explainable AI

Supervisor: Prof. Jiawei Yao | Tongji University June 2023 – September 2023

Traditional methods for modeling the urban heat island effect often suffer from a loss of detail in urban morphology. The Research introduced novel metrics and utilized explainable AI to model and interpret nonlinear scale heterogeneity of urban heat island effects, with findings published in Urban Climate.

- Led the quantitative analysis part of the research, including methodology design, data management, coding, result analysis, and visualization.
- Designed a set of stereoscopic urban morphology metrics for finer 3D modeling of urban form, achieving up to a 12.67% improvement in heat island effect prediction accuracy compared to traditional methods.
- Deployed explainable AI techniques to analyze the XGBoost Regression results, revealing nonlinear relationships between metrics and heat island effects to offer more detailed interpretations compared to traditional methods.
- Conducted modeling across 20 different sampling scales to explore the most suitable research scale for various urban indicators.

Modeling the Cooling Effect of Green Spaces with Machine Learning

Supervisor: Prof. Jiawei Yao | Tongji University January 2023 – April 2023

The mechanism and factors influencing the cooling effects of urban parks on the heat island effect remain unclear. The research employed machine learning methods to reveal the contribution of urban park green space features to heat mitigation, with findings presented at the 41st eCAADe conference.

- Led the quantitative analysis part of the research, including methodology design, data collection and management, coding, result analysis, and visualization.
- Calculated indicators including Land Surface Temperature (LST) and Normalized Difference Vegetation Index (NDVI), etc., based on high-resolution remote sensing imagery, collecting data on 2,000+ urban green spaces in Shanghai.
- Deployed multiple machine learning models (XGBoost, RFR, MLP, etc.) to predict the cooling effects of green spaces, identifying and interpreting the nonlinear relationships between various metrics and their impacts.

Research on the Influence of Spatial Factors on Pedestrian Flow

Supervisor: Prof. Fan Yang | Tongji University August 2021 – March 2022

The impact of spatial design on human behavior lacks a quantifiable evaluation method. The research explores an experimental approach to assess the influence of spatial elements on pedestrian flow characteristics, with findings presented at the 7th Tongji University Innovation Academic Forum.

- Led the research team in designing empirical experiments, developing deep learning algorithms, and conducting result analysis and visualization.
- Performed YOLOv5 and DeepSORT algorithms to track pedestrian trajectories through videos and designed a trajectory clustering algorithm adapted from DBSCAN to identify pedestrian flow patterns.
- Compared pedestrian movement trajectories extracted from videos (20+ hours) recorded under different experimental conditions, uncovering the varied impacts of spatial components, spatial morphology, and texture on pedestrian flow.

PROFESSIONAL EXPERIENCE

Beijing Tsinghua University Tongheng Planning and Design Institute Co., Ltd

Internship in the Department of Smart City December 2023 – March 2024

Data-driven city management system design and smart infrastructure planning.

- Designed a smart ecological facility management and planning framework for Wuhan New City, integrating remote sensing imagery, monitoring stations, and urban data platforms to manage environmental risks and tourism operations.
- Conducted case studies for a research report on Smart Industrial Parks, examining operational frameworks and components of different management systems, analyzing their strengths and weaknesses, and providing recommendations for future planning.

Shanghai Tongji University Urban Planning & Design Institute Co., Ltd

Internship in "Shanghai Urban Health Examination" Program June 2022 – September 2022

Evaluating the post-implementation status of urban planning projects.

- Managed the "urban health examination" database for Nanxiang Town, completing data collection, entry, verification, and cleaning for over 30 communities.
- Conducted analysis of resident feedback data to make assessments on facility coverage, service satisfaction, community inclusiveness and safety, etc.
- Visualized results and presented findings to the Nanxiang Town government for discussion.

PUBLICATIONS

[1] Shen, Y., **Kong, W**., Fei, F., Chen, X., Xu, Y., Huang, C., & Yao, J. (2024). Stereoscopic urban morphology metrics enhance the nonlinear scale heterogeneity modeling of UHI with explainable AI. Urban Climate, 56, 102006. https://doi.org/10.1016/j.uclim.2024.102006

[2] Shen, Y., **Kong, W.**, Chen, X., Fei, F., Xu, Y., Huang, C., & Yao, J. (2023). Using GeoAI to Reveal the Contribution of Urban Park Green Space Features to Mitigate the Heat Island Effect. In Proceedings of the 41st International Conference on Education and Research in Computer Aided Architectural Design in Europe (eCAADe) (Vol. 2, p. 2).

EXTRACURRICULAR ACTIVITIES

Extracurricular Course Coordinator for Junior High School **Shanghai, China**
Xinjiangwan Experimental School, affiliated to Tongji University August 2024 – December 2024

- Led a team of 12 people to design and implement semester-long interest courses for junior high school students, covering urban and architectural knowledge along with arts and crafts skills.

Volunteer Guide for Shanghai Official Urban Planning Exhibition **Shanghai, China**
Shanghai Urban Planning Exhibition Center October 2022 – December 2022

- Took the initiative to coordinate activities between the college and the exhibition center, while providing informative tours to visitors on topics such as Shanghai's 2035 Masterplan, the "Five New Cities" development, and architectural landmarks in these areas.

AWARDS & HONORS

2024 **Outstanding Student Award** of Tongji University

2024 **The Silver Award** of Competition of Metaverse IP and Space Design for Dongmen (2nd of all submissions)
Landscape architecture design "Waving & Soaring", awarded with approximately $1,500 USD.

2023 **The First Prize** of the 10th International Architecture Design Competition for College Students of Teamzero Award (1st of 683 submissions)
Architectural design "Parcel Hub Under the Highway", awarded with approximately $12,000 USD.

2023 **Honorable Mention Prize** of Interdisciplinary Contest in Modeling (ICM) (Top 15%)
Team leader of intensive 4-day research paper challenge on urban light pollution risk estimation titled "Fade Away with Stars".

2022 **The First Prize** of Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM) (Top 10%)
Team leader of intensive 3-day research paper challenge "Unmanned Aerial Vehicle Formation Flight Adjustment Method Based on Bearing-only Passive Location".

2021 **The First Prize** of 7th Tongji University Innovation Academic Forum (Top 10 of 74 projects)
Research project titled "Research on the Influence of Spatial Factors on Pedestrian Flow".

SKILLS

Languages: English (TOEFL 113/120), Chinese (Native)
Programming & computational tools: Python, C++, VB, MATLAB, SPSS
Geospatial analysis tools: ArcGIS Pro, ENVI
Computational design tools: Grasshopper
Design tools: SketchUp, Rhino, AutoCAD, Enscape, Lumion
Media tools: Adobe Illustrator, Adobe Photoshop, Adobe After Effects, Adobe InDesign

PERSONAL INTERESTS

Creative Interests: Origami, Piano, Photography, Video Production
Sports and Fitness: Badminton, Cricket