Zhihang Liu

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Research Interests

Complex Systems Modeling, Big Geospatial Data, Urban Computing, Land Use Policy, Computational Social Science

Work Experience

Full -time Research Assistant / The Chinese University of Hong Kong 2023.9-2024.3
- Institute of Space and Earth Information Science (http://www.iseis.cuhk.edu.hk/en/)
- **Participation in Project:** "Vehicle Detection and Vehicle-kilometrage Estimation Based on Remote Sensing Technologies", Smart Traffic Fund, The Government of Hong Kong SAR, No. PSRI/44/2208/PR, 2023 – 2025. (PI: Prof. Mei-Po Kwan) (Link)
- **Research Direction:** Deep Learning of Remote Sensing and Modeling of Complex Transportation Systems
- **Supervisor:** Prof. Mei-Po Kwan

Summer Intern / The JTL Urban Mobility Lab at MIT 2023.6-2023.9
- **Research Direction:** Mobility AI with urban imagery, networks, and natural language
- **Completed Project:** Holistic urban sensing based on remote sensing and street view images using Vision Transformers (https://github.com/Liu-Zhihang/MIT-Summer-Research-Interns)
- **Supervisor:** Prof. Jinhua Zhao

Full -time Research Assistant / Technical University of Munich 2022.9-2023.9
- Department of Aerospace and Geodesy, Professorship for Big Geospatial Data Management (https://www.bgd.ed.tum.de/en/)
- **Participation in Project:** "Towards a NAS Benchmark for Classification in Earth Observation", Sponsored by: TUM Data Science in Earth Observation cooperating with the German Aerospace Center (DLR), 2022-2023 (Link)
- **Research Direction:** Complexity & Complex Networks, Auto ML
- **Output papers:** *Efficiency and equity of the multimodal travel between public transit and bike-sharing accounting for multiscale*, *Spatio-temporal Analysis of Urban Economic Resilience during Covid-19 with Multilayer Complex Networks*
- Supervisor: Prof. Dr. Martin Werner

Part- time Research Assistant/IGSNRR, Chinese Academy of Sciences 2020.9- present
- Institute of Geographic Sciences and Natural Resources Research (http://english.igsnrr.cas.cn/
- **Participation in Project:** "Cooperative Observation, Transformation Mechanism and Scenario Simulation of Rural Areal System", Major Program of the National Natural Science Foundation of China, No. 42293270, 2023 – 2027. (PI: Prof. Liu Yansui) (Link)
- **Research Direction:** Regional complex systems simulation & Multi-Agent Reinforcement Learning
- **Output paper:** *Exploring Patterns of Rural Development through Collective Behavior-Based AI Simulation*
- **Supervisor:** Prof. Yurui Li

Education

MSc in Urban Planning (Geography)/Peking University   2021.9-2024.6
- Research Direction: Urban Computing
- Supervisor: Prof. Dr. Jiawen Yang

BA in Public Administration /Sun Yat-Sen University   2017.9-2021.7
- Research Direction: Computational Social Science
- Graduation Thesis: How Marketisation Affects Village Development: An Empirical Study Based on Multiple Sets of Village-level Data

Study Abroad Experiences   2019
- Guest Researcher, Department of Aerospace and Geodesy, Technical University of Munich;
- UK Study Abroad Programme (Full Scholarship), LSE, Cambridge, Oxford, UoM;
- CSC Excellent Undergraduate International Exchange Program, The University of Seoul;

Skills

Computer
- Data Analysis, Graphics, Modelling and Simulation, Python (TensorFlow, PyTorch), R, JavaScript, HTML, Julia, ArcGIS, NetLogo, GEE

Research Methods
- Machine Learning (Interpretable ML, Graph ML)
- Deep learning (Multi-Agent Reinforcement Learning, CV, NLP)
- Complex networks (Topology, Dynamics, Multilayer)
- Spatial algorithms
- Web spider & Geospatial web data visualization
- Advanced Statistics

Academic Experience

Publications
- Yao, Y., Lei, S., Guo, Z., Li, Y., Ren, S., **Liu, Z.**, ... & Luo, P. (2023). Fast optimization for large scale logistics in complex urban systems using the hybrid sparrow search algorithm. International Journal of Geographical Information Science, 1-29.

Working Papers
- Efficiency and equity of the multimodal travel between public transit and bike-sharing accounting for multiscale (First & Corresponding Author, accepted by IACP2022, Submit to *Sustainable Cities and Societies,* Revision)
- From positive support to negative reaction: The evolution of China's containment policy and its impact on public sentiment during the COVID-19 pandemic (First Author, accepted by IACP2022, Submit to *Humanities and Social Sciences Communications,* Revision)
- Spatio-temporal analysis of urban economic resilience during COVID-19 with multilayer complex networks (First & Corresponding Author, accepted by The ISPRS Geospatial Week 2023, GeoHB Workshop, Submissions in progress)[PDF]
- Exploring Patterns of Rural Development through Collective Behavior-Based AI Simulation(On going)

- Holistic urban sensing based on remote sensing and street view images using Vision Transformers (On going)
- How do the spatial mobility and economic model shape shop sign landscape? Based on street view images and deep learning (On going)
- Sensing Cities with large language model (On going)

Awards & Scholarship

Awards
- Travel Grants by the ISPRS Foundation for GSW'2023, 2-7 September   2023[Link]
- Global Perspectives - Peking University Graduate Student Scholarly Exchange Fund
  2023
- Excellent Paper Award in First National Student Land Survey Competition of China Land Science Society   2021
- Second Prize of the 16th Challenge Cup Guangdong University Student's Extra-curricular Academic Science and Technology Works Competition (Provincial). 2021
- Outstanding Talents Training Program for Law and Political Science(excellence)
  2017-2020
- Tsinghua University First Young Computational Social Scientist Award
  2020
- National Top 100 in All-China Youth Federation's "Youth in China" Eighth Summer Social Research and Practice Activities for College Students   2020

Scholarship
- Peking University Education Abroad Program Scholarship   2023
- Li Xuerou Foundation Scholarship of Sun Yat-sen University (top1%)   2021
- Professor Xia Shuzhang Scholarship of Sun Yat-sen University (top1%)   2021
- National Encouragement Scholarship (National)   2020
- Sun Yat-sen University Academic Innovation Scholarship (School)   2020
- China scholarship council Excellent Undergraduate International Exchange Scholarship (CSC)   2019
- Sun Yat-sen University UK Overseas Study Scholarship   2019
- National Encouragement Scholarship (Natiosnal)   2019
- Sun Yat-sen University Academic Scholarship   2019
- Sun Yat-sen University Fist Class Scholarship   2018