Sheng'ao Yi

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Education

University of Pennsylvania   **Philadelphia, US**

Doctor of Philosophy - City and Regional Planning;   *Aug. 2024 - Present*

Courses: *Introduction to City & Regional Planning: History, Theory, and Practice; Advanced Statistical Inference*

Advisor: *Prof. Xiaojiang Li,*

Research interests: AI for environmental planning, optimization, and design; Micro-scale urban analytics; GeoAI

University of Pennsylvania   **Philadelphia, US**

Master of Science - Urban Spatial Analytics; GPA: 3.81/4.0   *Aug. 2022 - Jun. 2023*

Courses: *Spatial Statistics and Data Analysis, Geospatial Data Science in Python, Java Script Programming for Planners and Designers, Modeling Geographic Space, Database and Information Systems*

Shenzhen University   **Shenzhen, China**

Bachelor of Engineering - Geospatial Information Engineering; GPA: 84.9/100   *Sept. 2018 - Jun. 2022*

Advisor: *Prof. Wei Tu*

Professional Experience

MIT Urban Mobility Lab   **Jun. 2023 – Hereto**

Research Intern   *Online*

- Conducting four research projects focusing on investigating the impacts of misallocation of bus drivers by looking at socioeconomic characteristics associated with bus routes.
- Measuring relationship between service quality and service area socioeconomic indicators and characteristics.
- Investigating relationship between service quality and surrounding urban characteristics.
- Quantifying the air pollutant exposure by customers based on estimated waiting time, inferred transfer waiting times and potential waiting times.
- Investigating the relationship between bus service quality and the heat exposure environment.

Tencent   **Sept. 2021 – Jun. 2022**

Machine Learning Researcher Intern   *Shenzhen, China*

- Completed an internship at Tencent, working on a project to detect fraudulent user behavior by analyzing multi-source spatio-temporal data and WeChat user trajectories.
- Contributed to the integration of multi-source spatio-temporal big data, including satellite images, open street maps, points of interest, and WeChat user trajectories, to construct a multi-view neural network model.
- Leveraged Tencent's internal machine learning platform (TaiJi) and database platform (IDEX), as well as PySpark, to process and analyze the data, store it in the appropriate format, and develop machine learning models for training.
- Demonstrated strong problem-solving skills and technical expertise in data processing and machine learning, contributing to the success of the project and gaining valuable experience in the field of anti-fraud technology.

Projects

NSF: Interactions of Sustainable Urban Design with Gentrification Processes   **Jan. 2024 - Jul. 2024**

- Creating an advanced analytical framework for evaluating and predicting green gentrification in urban regions.
- Collected and geolocated Google Street View images to create before-and-after pairs for the same buildings.
- Developed a deep learning method to detect changes between the paired images and predict their categorization of gentrification.

2022 Smart Cities Innovation Competition | *Python, Web development*   **Aug. 2022 - Dec. 2022**

- Building an intelligent management platform and multi-dimensional analysis framework for taxi and online ride-hailing data.
- Comparing the spatio-temporal distribution characteristics between taxi and online ride-hailing, analyzing the reasons through the trajectory orders.
- Developing an intelligent platform for the electric operation of taxi and online ride-hailing based on deep reinforcement learning.
- Providing practical suggestions for promoting the electrification of the taxi and online ride-hailing market.

Street quality pattern mining based on multi-source urban big data | *Street View Image, Deep Learning*

- Gathered road networks, street view images (SVIs), points of interest (POIs), and building footprints in the Greater Bay Area using Python.
- Developed an evaluation index system for street quality, considering both subjective perceptions and objective physical spaces.
- Analyzed the spatial aggregation of street quality and correlations among various index factors.
- Discovered street quality patterns using hierarchical clustering and compared features across cities in the Guangdong-Hongkong-Macao Greater Bay Area.

2020 Digital China Innovation Contest | *Deep Reinforcement Learning, Web development* **Sept. 2020 - Oct. 2020**
- Cleaned and processed large-scale trajectories and order data, integrating them with urban road network data using map matching algorithms. Split trajectories into segments and extracted relevant features for further analysis.
- Assisted in fusing deep reinforcement learning and travel knowledge to build a smart operating model for electric unmanned networked vehicles, which includes intelligent matching of electric unmanned vehicles and individual travels; advance scheduling of idle unmanned vehicles; Charging arrangements for electric unmanned vehicles.
- Led the development of a web application for visualizing spatio-temporal data and models using react.js, mapbox and deck.gl.

Publications

Yi, S. , Li, X., Wang, R., Guo, Z., Dong, X., Liu, Y., & Xu, Q. (2024). Interpretable spatial machine learning insights into urban sanitation challenges: A case study of human feces distribution in San Francisco. *Sustainable Cities and Society*, 105695.

Yi, Shengao, et al. Assessing the differential impact of suburban vegetated and urban built-up areas on heat exposure environment: A case study in Los Angeles is **under review** by the journal of *Sustainable Cities and Society*.

Yi, Shengao, et al. Assessing homeless shelter accessibility: A Spatio-Temporal 3SFCA approach to uncovering socioeconomic associations is **under review** by the journal of *Transportation Research Part D: Transport and Environment*.

Yi, Shengao, et al. Exploring the nonlinear relationships and interaction effects of urban environment on homeless incidence: A case study in New York City is **under review** by the *Environment and Planning B: Urban Analytics and City Science*.

Dong, X., Yang, R., Ye, Y., **Yi, S.**, Haase, D., & Lausch, A. (2024). Planning for green infrastructure by integrating multi-driver: Ranking priority based on accessibility-equity. *Sustainable Cities and Society*, 105767.

Chen, X., Tu, W., Yu, J., Cao, R., **Yi, S.**, & Li, Q. (2024). LCZ-based city-wide solar radiation potential analysis by coupling physical modeling, machine learning, and 3D buildings. Computers, Environment and Urban Systems, 113, 102176.

Cui, Q., Tan, L., Ma, H., Wei, X., **Yi, S.** et al. (2024). Effective or useless? Assessing the impact of park entrance addition policy on green space services from the 15-minute city perspective. *Journal of Cleaner Production*, 142951.

Tu, W., Ye, H., ... **Yi, S.**, & Li, Q. (2024). Deep online recommendations for connected E-taxis by coupling trajectory mining and reinforcement learning. *International Journal of Geographical Information Science*, 38(2), 216-242.

Zhao, T., **Yi, S.** Seasonal sensitivity analysis of Street View data is **under review** by the *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*.

Wang, R., **Yi, S.** et al. Exploring the associations between street-view green space quantity and quality, and influenza in Guangzhou, China through machine learning and spatial regression: A socio-economic equity perspective is **under review** by the journal of *Environment and Planning B: Urban Analytics and City Science*.

Ma, C., Zhang, Y., **Yi, S.** et al. Optimizing urban agricultural waste planning and management to enhance sustainability: Strategies for three types of cities is **under review** by the journal of *Sustainable Cities and Society*.

Li, Q., Zhang, J., **Yi, S.** et al. Street-level physical disorders, multi-scale socioeconomic disparities and neighbourhood satisfaction among Chinese older adults: Using street view data and a machine learning approach is **under review** by the journal of *Habitat International*.

Yang, W., Xu, Q., **Yi, S.** et al. Enhancing Transit-Oriented Development sustainability through the integrated Node-Place-Ecology (NPE) model is **under review** by the journal of *Transportation Research Part D: Transport and Environment*.

Yang, W., Xu, Q., ... **Yi, S.** Are different TOD circles oriented towards sustainability amidst urban shrinkage? Evidence from urban areas to suburbs in the Tokyo Metropolitan Area is **under review** by the *Journal of Environmental Management*.

GUO Xin, ZHANG Yixuan, **YI Shengao**,et al. Research on the Selection Mechanism and Quality Matching System of Frequently Used Pedestrian Streets: Taking Shenzhen as an Example[J]. *South Architecture*, 2023(7): 55-65.

GUO Xin, ZHAO Lifang, ZHANG Yixuan, **YI Shengao**,et al. Urban design oriented assessment of area-based traffic congestion: A case study of Shenzhen's metro station core area[J]. *Design Community*, 2023(02):12-23.

Horons & Awards

- **International Award**: Third Prize of 2022 Smart City Research and Innovation Scheme (SCRIS). July. 2023

- **School Award**: 2022 Excellent Graduation Thesis. Jun. 2022

- **National Award**: The Third Prize of 2021 Super Map Cup University GIS Competition. Oct. 2021

- **Software Copyright**: Electric Unmanned Networked Fleet Intelligent Operation and Monitoring Prototype System.
  Jul. 2021

- **Software Copyright**: Parade Car and Online Car-hailing Operation Analysis System. Jul. 2021

- **National Award**: The Fourth Winner of Big Data Track Creativity Award in 2020 Digital China Innovation Competition.
  Oct. 2020

Skills Summary

Languages:	Python, C++, JavaScript, R
Frameworks:	TensorFlow, React.js, Flask, NodeJS, Kelper.gl, Deck.gl, Mapbox
Tools:	Docker, GIT, PostgreSQL, MySQL
GIS Software:	ArcGIS, QGIS, Envi