Yeshuo Shu

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EDUCATION

Peking University, College of Urban and Environmental Sciences   *Beijing, China*

Master of Science in **Geography**[*]   *Sep. 2021 – Jul. 2024 (Expected)*

- Related Courses: Spatial-temporal Intelligence, Mathematic Application in Geography, Spatial Econometrics
- GPA: 3.75/4.0

Peking University, College of Urban and Environmental Sciences   *Beijing, China*

Bachelor of Engineering in **Urban and Rural Planning**   *Sep. 2017 – Jul. 2021*

- Related Courses: Quantitative Geography and System Engineering, Transportation Planning, Urban Economics, Remote Sensing and Image Interpretation, Geographic Information System, Urban Morphology
- GPA: 3.69/4.0

Peking University, National School of Development   *Beijing, China*

Dual Bachelor of Arts in **Economics**   *Sep. 2016 – Jul. 2021*

- Related Courses: Econometrics, Game theory
- GPA: 3.60/4.0

RESEARCH INTERESTS

My research focus lies at the intersection of **human mobility** and **travel behavior** in general, and particularly in:

- Human mobility patterns vis-à-vis urban planning and design:

  Geospatial big data provides the opportunity to explore the nature of urban spatial structure from the perspective of human mobility. Specific issues include 1) empirical analysis of the urban spatial structures that emerge from human activities juxtaposed with traditional urban form issues, such as street networks; 2) identifying potential conflicts between human activity patterns and the spatial structure of street networks before assessing the walkability and resilience.

- Applications in transportation research:

  The diversity in mobility and preferences engenders various interactive behaviors among road users. Particularly of interest is the future dynamic between vulnerable road users and autonomous vehicles within the complex urban traffic environment, such as shared spaces and intersections.

RESEARCH EXPERIENCE

Exploration of spatiotemporal big models   *2023.08 - Present*

Core researcher, supervised by Professor Liyan Xu

- Train Large Language Models (LLMs) to function as controllers for the dissection of geographical issues and the invocation of geospatial tools.
- Develop interactive web map service capable of comprehensive geographic question answering (GeoQA).
- Engage in representation learning within the specialized domain of trajectory data to probe the spatial reasoning capabilities.

Inference of user attributes based on geographic trajectory data   *2022.09 - 2023.06*

Core researcher, funded by the National Social Science Foundation of China (No. 22BGL279)

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[*] Due to the structuring of degree programs in China, there is an inconsistency between the Chinese and English names of the major; a direct translation of the Chinese term should be "Geography (Landscape Architecture)."

- Proposes a progressive feature extraction strategy that mines high-order mobility features from users' moving trajectory records from multi-dimensions (spatial, temporal, and semantic).
- Comprehensive high-order mobility features are extracted, such as travel motifs, rhythms decomposed by discrete Fourier transform (DFT) of mobility time-series, and vectorized place semantics by word2vec.
- Yield user clusters that common sense can interpret well, leading to further fine-grained user profiling through cross-order trajectory feature engineering.

Interactions and behavioral preferences among road-user groups   *2022.11 - 2023.09*
Core researcher, funded by the National Social Science Foundation of China (No. 22BGL279)
- Conduct video target recognition and trajectory extraction using YOLO and ByteTrack algorithms before computing the kinematic features of road users.
- Analyze the behavioral choice differences of three groups of road users (vehicle-pedestrian, vehicle-e-bike, e-bike-pedestrian) at right-turn-on-red crossroads by using the Quantal Response Equilibrium game theory-based model.
- Compare the pedestrian collective walking behavior preferences in diverse public spaces, confirming the potential of design to influence such behaviors.

Epidemic prevention strategies attuned to normalized urban flow patterns   *2022.08 - Present*
Team member, funded by the National Key Research and Development Plan (Grant No. 2022YFC3800803)
- Develop a multi-scale nested partitioning based on the community structure of transportation networks and the identification of spatial units within urban road networks.
- Assess the partitioned epidemiological risk based on crowd aggregation, mobility, and parcel semantics for targeted pandemic containment strategies.
- Evaluate the zonal performance utilizing Agent-Based Modeling (ABM) and risk coverage indifference curves for optimization.

Telecommunication Traffic Distribution Patterns and Energy Conservation   *2022.09 - Present*
Team member, funded by the National Social Science Foundation of China (No. 42371236)
- Exploring the mechanism of the spatial distribution pattern of wireless network data traffic in different scales and different scenarios.
- Using super-resolution techniques to make fine-grained measurements of wireless network data traffic.
- Inferring fine-grained network traffic and optimizing base station deployment for energy-saving.
- Exploring the underlying social mechanisms in the different mobile traffic distribution.

PUBLICATIONS

- Yeshuo Shu, Gangcheng Zhang, Keyi Liu, Jintong Tang, Liyan Xu (2023). A framework for mining lifestyle profiles through multi-dimensional and high-order mobility feature clustering. Submitting to ICCTA 2024: 7th International Conference on Geoinformatics and Data Analysis.
- Gangcheng Zhang, Yeshuo Shu*, Keyi Liu, Yuxuan Wang, Donghang Li, Liyan Xu (2023). Vehicles, Pedestrians, and E-bikes: a Three-party Game at Right-turn-on-red Crossroads Revealing the Dual and Irrational Role of E-bikes that Risks Traffic Safety. Transportation Research Part F: Traffic Psychology and Behaviour. Under review.
- Li Jie, Yeshuo Shu, Ningkang Chen, Fang Wang, Hui Li (2020). 'Re-socialisation' in isolated spaces: A case study on the social organisation of Fangcang shelter hospital patients under extreme spatial conditions. Indoor and Built Environment. DOI: 10.1177/1420326X20973745.
- Linlin Dai, Zixin Zhan, Yeshuo Shu, Xiao Rong (2022). Land Use Change in the Cross-Boundary Regions of a Metropolitan Area: A Case Study of Tongzhou-Wuqing-Langfang. Land. DOI: 10.3390/land11020153.

- Zixin Zhan, <u>Yeshuo Shu</u>, Feng Song (2021). Morphology Development of Chinese Danwei under Marketization Process: The Case of Wuhan Iron and Steel Company. XXVII International Seminar on Urban Form. DOI: 10.17868/strath.00080461.

LANGUAGE AND SKILLS

- **Language**: Chinese Mandarin (Native), English (TOEFL: 104, GRE: 330+4.0)
- **Coding language**: Python, R, SQL, HTML/CSS, JavaScript, STATA
- **Tools & Platforms**: Git, GIS (ArcGIS, QGIS), Adobe (PS, AI, AU), modeling (CAD, Sketchup, Unity)
- **Databases**: MySQL, PostgreSQL

ACADEMIC APPOINTMENT

Turenscape   *Beijing, Oct. 2023 – Present*

AI analyst

- Utilize generative algorithms such as diffusion and adversarial processes to aid in rationally structuring spatial representations after cleansing and organizing data and atlases.
- Conduct generalized and style-specific training for extant deep learning big models tailored to architectural, landscape, and urban planning project specifications.
- Contribute to constructing both the front-end and back-end architecture for the AIGC platform.

Beijing Municipal Institute of City Planning & Design   *Beijing, Sep. 2020 – Dec. 2020*

Research assistant

- Conduct a systematic quantitative analysis of the relationship between urban population planning policies and their actual implementation outcomes in Beijing over the past several decades, revealing a clear historical pattern of sustained ineffectiveness in Beijing population planning strategies.
- Analyze the spatial distribution of Beijing's projected population growth in urban planning against actual spatial expansion, quantifying the efficacy of plan implementation in terms of geographic allocation.

ADDITIONAL EXPERIENCE

- Participated in the territorial spatial planning of Wuqing District, Tianjin, conducting on-site surveys and research in Caozili Town.
- Attended the 8th International Conference on Sustainable Development (ICSD), delivering an online report about the food supply system during COVID-19.