

## Zhe-wei (Jacky) LIU

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### EDUCATION

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#### **Ph.D in Geographical Information Science, The Hong Kong Polytechnic University**

**Thesis Topic:** Semantic, Spatial and Temporal Modelling of Geotagged Social Media Data for Desirable Region and Event Detection, 08.2016-09.2021  
Supervised by Prof. Wenzhong Shi and Prof. Geoffery Shen

#### **B.S. in Remote Sensing and Geographical Information Science, Wuhan University**

GPA 3.65/4.0, Average Score 89.5/100, Ranking: 1/70 09.2011-06.2015

### PROFESSIONAL APPOINTMENTS AND EXPERIENCES

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Research Associate, The Hong Kong Polytechnic University 01.2022-date

Research Assistant, The Hong Kong Polytechnic University 02.2021-12.2021

### RESEARCH INTEREST

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GeoAI, urban informatics, human mobility, applied machine learning, location-based service

### COMPUTER SKILLS

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Programming Languages: Python, SQL, Matlab, C/C++, C#, Javascript  
Code Library: Pytorch, Keras, Scikit-learn, Numpy, Pandas, OpenCV, ArcObjects  
Skills: machine learning, large-scale database, complex network analysis, Git

### PUBLICATIONS

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**Liu Z**, Shi W\*, et al.. A LSTM-based approach for modelling the movement uncertainty of indoor trajectories with mobile sensing data. *International Journal of Applied Earth Observation and Geoinformation*, 108 (JCR Q1) <https://doi.org/10.1016/j.jag.2022.102758>

**Liu Z., Wang A\*, Chan Ed, et al. (2022)** Categorisation of cultural tourism attractions by tourist preference using location-based social network data: The case of Central, Hong Kong. *Tourism Management*, 90. (**JCR Q1, TOP Journal in Management/Tourism, IF = 10.967**) <https://doi.org/10.1016/j.tourman.2022.104488>

**Liu, Z., Shi, W., & Zhang, A. (2021).** Detecting home countries of social media users with machine-learned ranking approach: A case study in Hong Kong. *Applied Geography*, 134, 102532. (**JCR Q1**) <https://doi.org/10.1016/j.apgeog.2021.102532>

**Liu, Z., Zhang, A., Yao, Y., Shi, W., Huang, X., & Shen, X. (2021).** Analysis of the performance and robustness of methods to detect base locations of individuals with geo-tagged social media data. *International Journal of Geographical Information Science*, 35(3), 609-627. (**JCR Q1, TOP 1 Journal in GIS**) <https://doi.org/10.1080/13658816.2020.1847288>

Shi, W., **Liu, Z\***, An, Z., & Chen, P. (2021). RegNet: a neural network model for predicting regional desirability with VGI data. *International Journal of Geographical Information Science*, 35(1), 175-192. (**corresponding author**, with supervisor being first author). (**JCR Q1, TOP 1 Journal in GIS**) <https://doi.org/10.1080/13658816.2020.1768261>

**Liu, Z., Zhou, X., Shi, W., & Zhang, A. (2019).** Recommending attractive thematic regions by semantic community detection with multi-sourced VGI data. *International Journal of Geographical Information Science*, 33(8), 1520-1544. (**JCR Q1, TOP 1 Journal in GIS**) <https://doi.org/10.1080/13658816.2018.1563298>

**Liu, Z., Zhou, X., Shi, W., & Zhang, A. (2018).** Towards detecting social events by mining geographical patterns with VGI data. *ISPRS International Journal of Geo-Information*, 7(12), 481. <https://doi.org/10.3390/ijgi7120481>

Zhang, A., Shi, W., Tong, C., Zhu, X., Liu, Y., **Liu, Z.**, ... & Shi, Z. (2022). The fine-scale associations between socioeconomic status, density, functionality, and spread of COVID-19 within a high-density city. *BMC Infectious Diseases*, 22(1), 1-22.

Shen, X., Shi, W., Chen, P., **Liu, Z.**, Wang, L. (2022) Novel model for predicting individuals' movements in dynamic regions of interest. *GIScience & Remote Sensing* <https://doi.org/10.1080/15481603.2022.2026637>

Zhan, Z., Shi, W., Zhang, M., **Liu, Z.**, Peng, L., Yu, Y., & Sun, Y. (2022). Landslide Trail Extraction Using Fire Extinguishing Model. *Remote Sensing*, 14(2), 308. <https://doi.org/10.3390/rs14020308>

Shao, P., Yi, Y., **Liu, Z.**, Dong, T., Ren, D. (2022). Novel Multiscale Decision Fusion Approach to Unsupervised Change Detection for High-Resolution Images. *IEEE Geoscience and Remote Sensing Letters* <https://doi.org/10.1109/LGRS.2022.3140307>

Shao, P., Shi, W., **Liu, Z.**, & Dong, T. (2021). Unsupervised Change Detection Using Fuzzy Topology-Based Majority Voting. *Remote Sensing*, 13(16), 3171  
<https://doi.org/10.3390/rs13163171>

Yao, Y., Shi, W., Zhang, A., **Liu, Z.**, & Luo, S. (2021). Examining the diffusion of coronavirus disease 2019 cases in a metropolis: a space syntax approach. *International Journal of Health Geographics*, 20(1), 1-14 <https://doi.org/10.1186/s12942-021-00270-4>

Huang, X., Lu, J., Gao, S., Wang, S., **Liu, Z.**, & Wei, H. (2021). Staying at Home Is a Privilege: Evidence from Fine-Grained Mobile Phone Location Data in the United States during the COVID-19 Pandemic. *Annals of the American Association of Geographers*, 1-20. (JCR Q1)  
<https://doi.org/10.1080/24694452.2021.1904819>

Wang, A., Zhang, A., Chan, E. H., Shi, W., Zhou, X., & **Liu, Z.** (2021). A review of human mobility research based on big data and its implication for smart city development. *ISPRS International Journal of Geo-Information*, 10(1), 13. <https://doi.org/10.3390/ijgi10010013>

Chen, P., Shi, W., Zhou, X., **Liu, Z.**, & Fu, X. (2019). STLP-GSM: a method to predict future locations of individuals based on geotagged social media data. *International Journal of Geographical Information Science*, 33(12), 2337-2362. (JCR Q1, TOP 1 Journal in GIS)  
<https://doi.org/10.1080/13658816.2019.1630630>

## **PAPERS UNDER REVIEW**

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**Liu Z.**, Shi W\*, Zhang A. Measuring Chinese cities' economic development with mobile application usage. *Physica A: Statistical Mechanics and its Applications* (under review)

## **PATENTS**

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Shi W, **Liu Z.** Regional attraction assessment method and device. ZL 201910436416.0

Shi W, **Liu Z.** Method for predicting target area based on social media sign-in, terminal and storage medium. ZL 202011358914.7

Shi W, Wang M, **Liu Z.** Camera internal reference and camera relative laser radar external reference calibration method and electronic equipment. ZL 202110023285.0

Shi W, **Liu Z.** Regional attraction evaluation method and device. ZL 201910715730.2

## **GRANTS&FUNDINGS**

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### **External**

Home country detection of social media users based on machine-learned ranking, Open Research Funding, LIESMARS, China, RMB 50,000, **PI.** 01.2022-12.2023

Convolutional Network Frameworks for Spatial Regression (*under review*), General Research Funding, University Grants Committee, Hong Kong, HKD 1,083,600, **Co-I and leading writer**  
01.2023-12.2025

***Internal***

Postdoc Matching Fund (to support excellent Postdoc researcher with special University funding), The Hong Kong Polytechnic University, Hong Kong, China, HKD 364,054, **Funding Receiver**.  
01.2022-12.2023

## **RESEARCH PROJECT**

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**“Three-dimensional perception of urban agglomerations and data governance technology”, National Key R&D Program funded by Ministry of Science and Technology, P.R. China**  
2020- present

*Core researcher and developer*

- Model the patterns of human mobility and evaluate the results’ uncertainty using multi-sourced flow data, using Python libraries Scikit-learn, Numpy, Pandas.
- Data governance strategies are proposed to maintain the consistence and interoperability of heterogeneous data sources.

**“Collaborative computation for multi-source geographic big flow data”, funded by Ministry of Science and Technology, P.R. China**  
2018-2020

*Core researcher and developer*

- Develop a series of novel indicators to quantify the irregular human movement, with Python and ArcGIS
- Detect events by investigating the irregular patterns of the tracked human mobility using the Extreme Studentized deviate (ESD) statistical test.

**“Urban big data analytics for spatiotemporal human activity modeling and prediction”, funded by the Hong Kong Polytechnic University**  
2016-2018

*Core researcher and developer*

- A novel indicator is proposed to quantify the attractiveness of the urban regions with human mobility (location-based social network)
- A novel deep learning framework RegNet is proposed, using Python library Tensorflow, Keras, for predicting the attractiveness of the urban regions.

**“Monitoring of the Evolution of Urbanization of Dongguan”, funded by Department of Land and Resources of Guangdong Province, P.R. China**  
2014-2015

*Core researcher and developer*

- Evaluate urbanization of Dongguan city and develop a comprehensive software by leveraging C#, ArcObjects, and Oracle, for urbanization monitoring with geospatial features.

## TEACHING EXPERIENCE

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### Teaching Assistant, The Hong Kong Polytechnic University

Urban Informatics (LSGI545, 3 credits, 128 master students enrolled) 01.2022-03.2022

*This course provides a hands-on introduction to the tools, technologies, and practical approaches used to organize and analyze urban data. It enables students to apply the theories and concepts of urban science to a variety of practical issues in urban planning and Smart City development; utilize their knowledge of the theories, methods, and tools of urban science and informatics better understand cities and inform Smart City planning and development. The Teaching Assistant are responsible for conducting tutorial, introducing the latest advancements of smart cities, and teaching the usage of agent-based-model software NetLogo.*

Principles of GIS (LSGI521, 3 credits, 107 master students enrolled) 09.2021-11.2021

*This subject is to provide students with an understanding of the theory embodied in spatial information systems in terms of spatial data modeling; spatial data structures; data analysis techniques; visualization and presentation, and an understanding of the flow of data and its various transformations from raw data collection to result presentation. The Teaching Assistants are responsible for conducting lecture and lab tutorial, introducing components of GIS, spatial data models, data management, spatial analysis, GIS applications, and hands-on experience on ArcGIS Pro.*

Research Frontiers in Construction and Environment (CE603, 3 credits, 105 doctoral students enrolled) 11.2019

*This subject is intended to provide students with: a good understanding of the research foci and achievements of the Faculty and its constituent departments; a broad perspective of key research issues in the broad field of construction and environment; general knowledge of the current status and future challenges of key research areas of FCE and their relationship with the student's own research. The Teaching Assistants are responsible for conducting lecture and lab tutorial, introducing geographic data capturing, management, visualization, processing and applications.*

Hydrographic Surveying (LSGI3350A, 3 credits, 87 undergraduates enrolled) 12.2016

*This subject introduces the technology of Hydrographic Surveying to students. Its purpose is to provide the necessary knowledge and practical instrument operational and data processing skills needed for them to confidently accomplish a bathymetric survey in the real world (at water area near Sai Kung, Hong Kong) during field camp at the conclusion of the course. This subject also aims to develop students' critical and creative thinking, as well as cooperative attitudes & behavior of working with others. The Teaching Assistants are responsible for conducting lab tutorial and field camp, teaching the use of total station, and CAD software.*

## AWARDS & HONORS

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- Outstanding Graduates of Wuhan University, 2015 (10%)

- Annual Outstanding Students of Wuhan University, three times (2012, 2013, 2014) (10%)
- Second Honor Scholarship of Wuhan University, twice (2013, 2014) (10%)
- Xijie Special Scholarship, 2012
- First Honor Scholarship of Wuhan University, 2012 (2%)

## **LANGUAGES**

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**Mandarin:** Native

**English:** Professional Proficiency, **GRE:** 329/340

**Cantonese:** Elementary Proficiency

## **SERVICE**

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Reviewer for IEEE Transactions on Image Processing

Reviewer for Environment and Planning B: Urban Analytics and City Science

Co-founder/Coordinator of Taibai Reading Club, the Hong Kong Polytechnic University 2017-Present