

Fangzheng Lyu

ASSISTANT PROFESSOR · DEPARTMENT OF GEOGRAPHY · VIRGINIA TECH

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Education

University of Illinois Urbana-Champaign

PH.D. GEOGRAPHY

Urbana, IL

2024

University of Illinois Urbana-Champaign

M.S. GEOGRAPHY

Urbana, IL

2021

University of Hong Kong

B.E. COMPUTER ENGINEERING

Hong Kong

2018

Academic Appointment

Assistant Professor

DEPARTMENT OF GEOGRAPHY · VIRGINIA TECH

2024 - pres.

Blacksburg, VA

Research/Teaching Assistant

DEPARTMENT OF GEOGRAPHY AND GIS · UIUC

2018 - 2024

Urbana, IL

Research Assistant

DEPARTMENT OF COMPUTER SCIENCE · HKU

2017

Hong Kong

Research Interests

Geospatial Data Science; Computational Science; Urban Informatics; CyberGIS; Geospatial AI; Remote Sensing

Publications (An underline denotes a student advisee)

JOURNALS

Song, Z., Zhang, Z., **Lyu, F.**, Bishop, M., Liu, J., Chi, Z. (2024) From Individual Motivation to Geospatial Epidemiology: A Novel Approach Using Fuzzy Cognitive Maps and Agent-Based Modeling for Large-Scale Disease Spread. *Sustainability*, 16(12):5036. DOI: 10.3390/su16125036

Lyu, F., Zhou, L., Park, J., Baig, F., Wang, S. (2024). Mapping dynamic human sentiments of heat exposure with location-based social media data. *International Journal of Geographical Information Science*, 1–24. DOI: 10.1080/13658816.2024.2343063

Jin, X., Yang, J., Yue, W., Wang, S., Yang, D., Xiao, X., Xue, B., Dou, Y., **Lyu, F.**, Wang, S. (2023). Coastal areas to interior areas: global economic evolution pattern and mechanism. *Humanities and Social Sciences Communications*, 10, 723 DOI: 10.1057/s41599-023-02234-4

Li, X., Ma, X., **Lyu, F.**, and Song, Y. (2023). Examine the environmental inequity impact of urban heat mitigation on redlining legacy: case study of Charlotte from 2001 to 2020. *Frontiers in Environmental Science*. DOI: 10.3389/fenvs.2023.1218819

Su, H., Kang, J., **Lyu, F.**, Baig, F., Smilovsky, D., Park, J., Wang, S. (2023). A CyberGIS Approach to Exploring Neighborhood-level Social Vulnerability for Disaster Risk Management. *Transactions in GIS*. DOI: 10.1111/tgis.13106.

Park, J., Michels, A., **Lyu, F.**, Han, S., Wang, S. (2023). Daily changes in spatial accessibility to intensive care unit (ICU) beds and their relationship with the case-fatality ratio of COVID-19 in the state of Texas, USA. *Applied Geography*, 102929, ISSN 0143-6228, DOI: 10.1016/j.apgeog.2023.102929.

Lyu, F., Wang, S., Han, S., Wang, S. (2022, Volume 1, Issue 1). An Integrated CyberGIS and Machine Learning Framework for Fine-Scale Prediction of Urban Heat Island Using Satellite Remote Sensing and Urban Sensor Network Data. *Urban Informatics* 1, 6. DOI: 10.1007/s44212-022-00002-4

- Wu, S., Qi, J., Yan, Z., **Lyu, F.**, Lin, T., Wang, Y., Du, Z. (2022). Spatiotemporal assessments of nutrients and water quality in coastal areas using remote sensing and a spatiotemporal deep learning model. *International Journal of Applied Earth Observation and Geoinformation*. Volume 112, 2022, 102897, ISSN 1569-8432, DOI: 10.1016/j.jag.2022.102897
- Chen, X., Wang, S., Li, H., **Lyu, F.**, Liang, H., Zhang, X., Zhong, Y. (2022). Ndist2vec: Node with Landmark and New Distance to Vector Method for Predicting Shortest Path Distance along Road Networks. *ISPRS International Journal of Geo-Information*. 2022; 11(10):514. DOI: 10.3390/ijgi11100514
- Wang, C., **Lyu, F.**, Wu, S., Wang, Y., Xu, L., Zhang, F., Wang, S., Wang, Y., Du, Z. (2022). A deep trajectory clustering method based on sequence-to-sequence autoencoder model. *Transaction in GIS*, 26, 1801– 1820. DOI: 10.1111/tgis.12905
- Lyu, F.**, Xu, Z., Ma, X., Wang, S., Li, Z., Wang, S. (2021). A vector-based method for drainage network analysis based on LiDAR data. *Computers and Geosciences*, 2021, 104892, ISSN 0098-3004. DOI:10.1016/j.cageo.2021.104892
- Kang, JY., Michels, A., **Lyu, F.**, Wang, S., Agbodo, N., Freeman, V., Wang, S. (2020). Rapidly measuring spatial accessibility of COVID-19 healthcare resources: a case study of Illinois, USA. *International Journal of Health Geographics* 19, 36. DOI: 10.1186/s12942-020-00229-x

BOOK CHAPTERS

- Lyu, F.**, Kang, JY., Wang, S., Han, SY., Li Z., and Wang S. (2021). Multi-scale CyberGIS Analytics for Detecting Spatiotemporal Patterns of COVID-19. In: Shaw SL., Sui D. (eds) *Mapping COVID-19 in Space and Time*. Human Dynamics in Smart Cities. Springer, Cham. DOI: 10.1007/978-3-030-72808-3_11
- Wang, S., **Lyu, F.**, Wang, S., Catlet, C., Padmanabhan, A., Soltani, K. (2021). Integrating CyberGIS and Urban Sensing for Reproducible Streaming Analytics. *Urban Informatics*, ISBN 978- 981-15-8983-6. Springer Singapore. DOI:10.1007/978-981-15-8983-6_36

CONFERENCE PROCEEDINGS

- Kang, Y., **Lyu, F.**, Wang, S. (2024). NetPointLib: Library for Large-Scale Spatial Network Point Data Fusion and Analysis. In *Practice and Experience in Advanced Research Computing 2024: Human Powered Computing (PEARC '24)*. Association for Computing Machinery, New York, NY, USA, Article 43, 1–4. DOI: 10.1145/3626203.3670615
- Lyu, F.**, Ma, X., Song, Y., Zhu, E., Wang, S. (2023). Large-scale Google Street View Images for Urban Change Detection. *I-GUIDE Forum 2023*. DOI: 10.5703/1288284317674
- Lyu, F.**, Yang, Z., Xiao, Z., Diao, C., Park, J., Wang, S. (2022). CyberGIS for Scalable Remote Sensing Data Fusion. In: *Proceedings of Practice and Experience in Advanced Research Computing (PEARC22)*, Association for Computing Machinery, New York, NY, USA, Article 35, 1–4. DOI: 10.1145/3491418.3535145
- Padmanabhan, A., Yin, D., **Lyu, F.**, Wang, S. (2019). Bridging Local Cyberinfrastructure and XSEDE with CyberGIS-Jupyter. In: *Proceedings of Practice and Experience in Advanced Research Computing (PEARC19)*, Chicago, Illinois, USA. DOI: 10.1145/3332186.3332205
- Lyu, F.**, Yin, D., Padmanabhan, A., Choi, Y., Goodall, J., Castronova, A, Tarboton, D., Wang, S. (2019). Reproducible Hydrological Modeling with CyberGIS-Jupyter: A Case Study on SUMMA. In: *Proceedings of Practice and Experience in Advanced Research Computing (PEARC19)*, Chicago, Illinois, USA. DOI: 10.1145/3332186.3333052

UNDER REVIEW

- Lyu, F.**, Baig, F., Kang, Y., Li, E., Padmanabhan, A., Wang, S. DData with Notebooks: A Convergence Framework for Integrating CyberGIS Education and Research on I-GUIDE Platform
- Lyu, F.**, Kiv, D., Ma, X., Wang, S. Video Machine Learning Framework for Spatiotemporal Analysis in Urban Complex System
- Lyu, F.**, Yang, Z., Wang, S., Diao, C. Multi-stream STGAN: A Spatiotemporal Image Fusion Model with Improved Spatial Transferability
- Ma, X., Song, Y., **Lyu, F.**, Yang, Y., Wang, Y, Li, X., Zhong, S. Revitalizing Cities: The 5R Framework Approach to Urban Retrofitting and Big Data Insights
- Lyu, F.**, Zhu, E., Song, Y., Ma, X., Michels, A., Kang, Y., Wang, S. Quantifying Urban Retrofitting: Where, When and What
- Lyu, F.**, Kang, Y., Wang, S. Synthesizing Machine Learning and High-performance computing for Geospatial knowledge discovery - A review.

Presentations

ORAL PRESENTATIONS

- Lyu, F.** (2024). Understanding Urban Heat Dynamics with Advanced Cyberinfrastructure and CyberGIS. Geospatial Cyberinfrastructure Workshop: Building High-Performance, Ethical, and Secured Geospatial Software. *2024 AAG Annual Meeting, Honolulu, HI.*
- Lyu, F.,** Yang, Z., Diao, C., Wang, S. (2024). Multi-stream STGAN: Spatiotemporal Image Fusion with Improved Spatial Transferability. *2024 AAG Annual Meeting, Honolulu, HI.*
- Lyu, F.**(2023). Urban Heat Measurement with CyberGIS and Large-scale Geospatial Data. *Guest Lecturer, GEOG228. Urban Geography, The University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- Lyu, F.,** Ma, X., Song, Y., Zhu, E., Wang, S. (2023). Large-Scale Google Street View Images for Urban Change Detection. *I-GUIDE Forum 2023, New York City, NY.*
- Lyu, F.,** Zhou, L., Park, J., Baig, F., Wang, S. (2023). Mapping Real-time Heat Exposure with Social Media Data. *2023 AAG Annual Meeting, Denver, CO.*
- Lyu, F.** (2022). An Integrated CyberGIS and Machine Learning Framework for Fine-scale and Real-time Understanding of Urban Heat Dynamic. *UIUC GIS colloquium, Urbana, IL.*
- Lyu, F.,** Yang, Z., Xiao, Z., Diao, C., Park, J., Wang, S. (2022). CyberGIS for Scalable Remote Sensing Data Fusion. *PEARC22, Boston, MA.*
- Lyu, F.,** Wang, S., Han, SY., Catlett, C., and Wang, S. (2022). Fine-Scale Prediction of Urban Heat Island Using Satellite Remote Sensing and Urban Sensor Network Data. *2022 AAG Annual Meeting. Virtual*
- Lyu, F.,** Xu, Z., Ma, X., Wang, S., Li, Z., and Wang, S. (2019). Vector-Based Drainage Direction Analysis for High-Resolution Digital Elevation Models. *2019 AAG Annual Meeting, Washington, D.C.*
- Lyu, F.,** Yin, D., Padmanabhan, A., Choi, Y., Goodall, JL., Castronova, A., Tarboton, D., and Wang, S. (2019). Reproducible Hydrological Modeling with CyberGIS-Jupyter: A Case Study on SUMMA. *PEARC19, Chicago, IL.*

POSTER PRESENTATIONS

- Lyu, F.,** Xu, Z., Ma, X., Wang, S., Li, Z., and Wang, S. (2023). A vector-based method for drainage network analysis based on LiDAR data. *SESE Research Review, Urbana, IL.*
- Lyu, F.,** Wang, S. Han, SY., Catlett, C, and Wang, S. (2022). An integrated cyberGIS and machine learning framework for fine-scale prediction of Urban Heat Island using satellite remote sensing and urban sensor network data. *2022 Geo-Resolution Conference. Saint Louis, MO.*
- Lyu, F.,** Xu, Z., Ma, X., Wang, S., Li, Z., and Wang, S. (2022). A vector-based method for drainage network analysis based on LiDAR data. *I-GUIDE AHM, Chicago, IL.*
- Lyu, F.,** Yin, D., Padmanabhan, A., and Wang, S. (2019). Reproducible Hydrological Modeling with CyberGIS-Jupyter. *2019 GIS Day in UIUC, Urbana, IL.*

Teaching Experiences

Instructor

GEOG2084/5064 - PRINCIPLES/ELEMENTS OF GIS, VIRGINIA TECH

2024 Fall

Instructor

GGIS105 - THE DIGITAL EARTH, UIUC

2022 Summer

Teaching Assistant

GGIS407 - FOUNDATIONS OF CYBERGIS & GEOSPATIAL DATA SCIENCE, UIUC

2022 Spring

Instructor

GGIS507 - HIGH-PERFORMANCE GEOSPATIAL COMPUTING, UIUC

2021 Fall

Fellowships and Scholarships

AAG Geospatial Cyberinfrastructure Workshop Scholarship NATIONAL SCIENCE FOUNDATION CYBERTRAINING PROJECT	2024
George Beatty Fellowship UNIVERSITY OF ILLINOIS	2023 - 2024
HKU Foundation Scholarship for Outstanding Student UNIVERSITY OF HONG KONG	2015 - 2018
HKU Worldwide Undergraduate Student Exchange Scholarship UNIVERSITY OF HONG KONG	2017
Soong Ching-ling Scholarship SHANGHAI SOONG CHING LING FOUNDATION	2014 - 2018

Awards

2nd Place, Urban Informatics Paper of the Year INTERNATIONAL SOCIETY FOR URBAN INFORMATICS	2023
Student of the Year CYBERGIS CENTER, UIUC	2023
Finalist, AAG-GISS Student Paper Competition ASSOCIATION OF AMERICAN GEOGRAPHERS	2022
Finalist, AAG Robert Raskin Student Competition ASSOCIATION OF AMERICAN GEOGRAPHERS	2019
First Division Honor UNIVERSITY OF HONG KONG	2018
Dean's Honor List UNIVERSITY OF HONG KONG	2017
Walter Brown Memorial Prizes in Mathematics UNIVERSITY OF HONG KONG	2015
Reaching Out Award HKSAR GOVERNMENT SCHOLARSHIP FUND	2015
First Prize at Zhejiang Physics Olympiad ZHEJIANG PHYSICAL SOCIETY	2013

Services

Reviewer

- COMPUTATIONAL URBAN SCIENCE
- ENVIRONMENTAL MODELING & SOFTWARE
- GEO-SPATIAL INFORMATION SCIENCE
- HELIYON
- IEEE TRANSACTIONS ON BIG DATA
- JOURNAL OF SPATIAL INFORMATION SCIENCE
- THE EGYPTIAN JOURNAL OF REMOTE SENSING AND SPACE SCIENCES
- SCIENCE GATEWAYS
- TRANSACTIONS IN GIS

Program Committee

- I-GUIDE FORUM 2024, 2024
- SCIENCE GATEWAYS 2024, 2024
- UIUC SCHOOL OF EARTH, SOCIETY, AND ENVIRONMENT RESEARCH REVIEW, 2023

American Association of Geographers

- **DIRECTOR**, AAG CYBERINFRASTRUCTURE SPECIALTY GROUP, 2023-2025
- **ORGANIZER**, AAG 2024 SYMPOSIUM ON GEOSPATIAL DATA SCIENCE FOR SUSTAINABILITY, 2024
- **SESSION CHAIR** AAG 2023 CYBERGIS AND HIGH-PERFORMANCE GEOSPATIAL COMPUTING, 2023

Student Advised

- ERIC ZHU, B.S. IN COMPUTER SCIENCE, UIUC, 2022 - 2024
- LIXUANWU ZHOU, M.S. IN GEOGRAPHY AND GIS, UIUC, 2021 - 2023

Mentor · 2019 AAG-UCGIS Summer School, UIUC, 2019