

FANGZHENG LYU

DEPARTMENT OF GEOGRAPHY AND GEOGRAPHIC INFORMATION SCIENCE · UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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Education

University of Illinois Urbana-Champaign

Urbana, IL

PH.D. GEOGRAPHY AND ENVIRONMENTAL STUDIES

2023 (Expected)

- Dissertation Title: An Integrated CyberGIS and Machine Learning Framework for Data-Intensive Urban Analytics
- Advisor: Dr. Shaowen Wang

University of Illinois Urbana-Champaign

Urbana, IL

M.S. GEOGRAPHY

2021

University of Hong Kong

Hong Kong

B.E. COMPUTER ENGINEERING

2018

- Minor in Statistics and Math
- First Division Honor
- Advisor: Dr. Tak-Wah Lam

Northwestern University

Evanston, IL

STUDENT EXCHANGE

2016

University of California, Berkeley

Berkeley, CA

STUDENT EXCHANGE

2015

Research Interests

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

Publications

JOURNAL PAPERS

- 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, <https://doi.org/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
- 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
- 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
- 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

PEER-REVIEWED CONFERENCE PROCEEDINGS

- 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
- 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, July 28 – August 1, 2019. DOI: 10.1145/3332186.3333052
- 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, July 28 – August 1, 2019. DOI: 10.1145/3332186.3332205

UNDER REVIEW

- Lyu, F.**, Zhou, L., Park, J., Baig, F., Wang, S. Mapping Dynamic Human Sentiments of Heat Exposure with Location-Based Social Media Data. In revision with *International Journal of Geographical Information Science*
- Jin, X., Yang, J., Yue, W., Wang, S., Yang, D., Xiao, X., Xue, B., Dou, Y., **Lyu, F.**, Wang, S. Coastal areas to interior areas: global economic evolution pattern and mechanism. In revision with *Humanities and Social Sciences Communications*
- Su, H., Kang, J., **Lyu, F.**, Baig, F., Smilovsky, D., Park, J., Wang, S. A CyberGIS Approach to Exploring Neighborhood-level Social Vulnerability for Disaster Risk Management. In revision with *Transactions in GIS*
- Li, X., **Lyu, F.**, Song, Y., Ma, X. Examine the environmental inequity impact of urban heat mitigation on redlining legacy: case study of Charlotte from 2001 to 2020. In review with *Frontiers in Environmental Science*

IN PREPARATION

- Lyu, F.**, Yang, Z., Diao, C, Wang, S. Spatiotemporal Image Fusion with Improved Spatial Transferability: Multi-stream STGAN
- Lyu, F.**, Wang, S. Video-based Machine Learning Framework for Spatiotemporal Analysis in the Urban Context: A case study on Extreme Urban Heat Problem
- Lyu, F.**, Wang, S. Synthesizing Machine Learning and High-performance computing for Geospatial knowledge discovery - A review
- Park, J. **Lyu, F.**, Michels, A., Wang, S. Spatial disaggregation per unique longitudinal sequences in dynamic spatial accessibility: a case study of primary care in New York City

Presentations

ORAL PRESENTATIONS

- 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, J.L., 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, S.Y., 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** 2022 Summer
GEOG105 - THE DIGITAL EARTH, UIUC
- Teaching Assistant** 2022 Spring
GEOG407 - FOUNDATIONS OF CYBERGIS & GEOSPATIAL DATA SCIENCE, UIUC
- Instructor** 2021 Fall
GEOG507 - HIGH-PERFORMANCE GEOSPATIAL COMPUTING, UIUC

Fellowships and Scholarships

- George Beatty Fellowship (USD \$11,040)** 2023
UNIVERSITY OF ILLINOIS
- HKU Foundation Scholarship for Outstanding Student (HKD \$90,000)** 2015 - 2018
UNIVERSITY OF HONG KONG
- HKU Worldwide Undergraduate Student Exchange Scholarship** 2017
UNIVERSITY OF HONG KONG
- Soong Ching-ling Scholarship (RMB ¥200,000)** 2014 - 2018
SHANGHAI SOONG CHING LING FOUNDATION

Awards

- Finalist, AAG-GISS Student Paper Competition** 2022
ASSOCIATION OF AMERICAN GEOGRAPHERS
- Finalist, AAG Robert Raskin Student Competition** 2019
ASSOCIATION OF AMERICAN GEOGRAPHERS
- First Division Honor** 2018
UNIVERSITY OF HONG KONG
- Dean's Honor List** 2017
UNIVERSITY OF HONG KONG
- Walter Brown Memorial Prizes in Mathematics** 2015
UNIVERSITY OF HONG KONG

- Reaching Out Award** 2015
HKSAR GOVERNMENT SCHOLARSHIP FUND
- First Prize at Zhejiang Physics Olympiad** 2013
ZHEJIANG PHYSICAL SOCIETY

Professional Experiences

- Graduate Research Assistant** 2018 - Present
DEPARTMENT OF GEOGRAPHY AND GIS · UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN
- Fine-scale and real time urban heat dynamics analytic
 - Build a GAN-based image fusion model for remote sensing images
 - Develop a vector-based method for water feature extraction based on LiDAR data
 - Implement science gateway for environmental modelling on HPC
- Software Engineer Intern** 2017
L3 BIOINFORMATICS LIMITED · HONG KONG SAR
- Develop statistical models to analyze the deoxyribonucleic acid (DNA) sequence for Chinese ethnic
- Undergraduate Research Assistant** 2017
DEPARTMENT OF COMPUTER SCIENCE · UNIVERSITY OF HONG KONG
- Analyze encrypted Internet traffic with deep learning model
- Software Engineer Intern** 2016
NETEASE, INC · HANGZHOU, CHINA
- Work in multimedia and AI team to develop software to test Youdao Dictionary's consistency on different mobile platform

Professional Services

- Reviewer** · *Environmental Modelling & Software; Transactions in GIS; The Egyptian Journal of Remote Sensing and Space Sciences; Journal of Spatial Information Science*
- Director** · *AAG CyberInfrastructure Specialty Group, 2023-2025*
- Session Chair** · *AAG 2023 Symposium on Harnessing the Geospatial Data Revolution for Sustainability Solutions: CyberGIS and High-Performance Geospatial Computing*
- Student Committee Member** · *2023 School of Earth, Society, and Environment (SESE) Research Review, UIUC*
- Student Mentor** · *2019 AAG-UCGIS Summer School, UIUC*

Technical Skills

- Programming Language** · Python · C++ · R · Linux · HTML
- Computing System** · HPC · Docker · Slurm
- Software** · ArcGIS · ENVI · Wolfram Mathematica