International Symposium on

Spatiotemporal Data Science

Virginia Tech Research Center – Arlington & George Mason Univ. Mason Square
July 22-24, 2024

Pre-symposium Workshop & KNIME Data Connect	**Date: July 22, 2024** **Location**: Virginia Tech Research Center, 900 N Glebe Rd, Arlington, VA 22203
On-site Symposium Sessions	**Date: July 23, 2024** **Location**: George Mason Square, 3351 Fairfax Dr, Arlington, VA 22201
Online Symposium Sessions	**Date: July 24, 2024** **Location**: online from anywhere

Supported by the Spatial Data Lab project, Harvard CGA

Co-Hosts:

- Virginia Tech
- George Mason University

Co-Sponsors:

- NSF-sponsored Spatiotemporal Innovation Center
- Future Data Lab
- KNIME, Inc.
- Journal of Urban Informatics

Co-Chairs of Executive Committee:

- Phil Yang, George Mason University
- Shuming Bao, Future Data Lab

Co-Chairs of Steering Committee:

- Daniel Sui, Virginia Tech
- Andre Marshall, George Mason University

Co-Chairs of Program Committee:

- Siqin Wang, University of Southern California
- Peter Kedron, UCSB
- Xiao Huang, Emory University

Co-Chairs of Local Organizing Committee:

- Mengxi Zhang, Virginia Tech
- Fengxiu Zhang, George Mason University
- Lingbo Liu, Harvard University

Chair of Website Committee:

- Zifu Wang, George Mason University

Location: The onsite event will be placed on Virginia Tech Research Center (900 N Glebe Rd, Arlington, VA 22203, map, July 22 workshop) and George Mason Square (3351 Fairfax Dr, Arlington, VA 22201, map, July 23 Symposium). The July 24th online sessions will be conducted via Zoom.

Conference Registration: https://www.eventbrite.com/e/812024947477

Publications: Those papers presented at the symposium are invited to three special issues of Urban Informatics, Remote Sensing and Big Earth Data with article publishing charge (APC) waived.

Contact: Spatialdatalab@lists.fas.harvard.edu

The Overall Schedule of the Symposium

July 23-24, 2024

July 23, 2024						
Room	ARLVM 134, George Mason Square (Arlington)					
9:00-9:30 AM	**Welcome**					
9:30-10:00 AM	**Keynote: John Wilson**					
10:00-10:30 AM	**Keynote: Michael Goodchild**					
Break						
10:45-12:00 PM	A-1-i **Plenary Vision Panel: Impact of Spatiotemporal Data Science and GeoAI**					
Lunch	First floor classrooms (Keynote: Daniel Q. Duffy, ARLVM 134)					
Room	134	120	121	311	128	312
1:15-2:45 PM	1: PH-1-i	3: B-1-i	5: C-1-i	7: U-1-i	9: D-1-i	11:FMS-1-i
Break						
3:00-4:30 PM	2: W-1-i	4: CLT-1-i	6: C-2-i	8: PLP-1-i	10: HA-1-i	12: SDL-1-i
Dinner						
6:00-8:00 PM	MalaTang, 3434 Washington Blvd, Arlington, VA 22201					
July 24, 2024						
Virtual Room						
9:00-9:30 AM	**Keynote: Krzysztof Janowicz**					
9:30-11:00 AM	**Plenary Panel: Digital Twin and Spatiotemporal Data Science**					
Break						
Virtual Rooms						
11:15-12:30PM	13: A-2-o	14: B-2-o	15: C-3-o	16: OS-1-o		
Lunch						
1:30-3:00PM	17: W-2-o	18: MM-1-o	19: HA-2-o	20: PCS-1-o		
Break						
3:15-4:30PM	21: F-1-o	22: CLT-1-o	23: S-1-o	24: GAI-1-o		

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Keynotes Speakers:

Michael Goodchild
Emeritus Professor of Geography
UC Santa Barbara

GeoAI, the Social Sciences, and Ethics

Michael F. Goodchild is Emeritus Professor of Geography at the University of California, Santa Barbara. He was Jack and Laura Dangermond Professor of Geography, and Director of UCSB's Center for Spatial Studies before retired. He was elected member of the National Academy of Sciences, the American Academy of Arts and Sciences, the Royal Society of Canada, and the Royal Society and Corresponding Fellow of the British Academy. In 2007 he received the Prix Vautrin Lud prize.

John Wilson
Professor of Sociology and Spatial Sciences
Founding Director, Spatial Sciences Institute
University of South California

Situating GeoAI within the rapidly expanding and evolving spatial sciences ecosystem

John P. Wilson is professor of spatial sciences and sociology at the University of Southern California where he is founding director of the Spatial Sciences Institute. His research focuses on the modeling of environmental systems and makes extensive use of GIS software tools, fieldwork, spatial analysis techniques and computer models. He has published numerous books and articles. Much of this work is collaborative and cross-disciplinary with the goal of improving knowledge and understanding of the factors linking society, the environment and human health.

Krzysztof Janowicz
Professor of Geographic Information Science
University of Vienna and UCSB

GeoMachina: Can RAG-based AI agents replace GIS analysts by 2026?

Krzysztof Janowicz is a professor of Geographic Information Science at the University of Vienna and affiliated faculty at the University of California, Santa Barbara. Janowicz is an Editors-in-Chief of the Semantic Web journal. His research combines representation learning and classical knowledge representation to study how humans conceptualize geographic space.

The International Symposium on Spatiotemporal Data Science

Date: July 22 and 23 (onsite and online), July 24 (online only), 2024

DAY 1 – Monday, July 22, 2024

9:00 AM-5:00 PM Pre-symposium Workshop
Spatiotemporal Innovation and GeoAI Applications

Location: Virginia Tech Research Center – Arlington, 900 N Glebe Rd, Arlington, VA 22203

I. Replicable Data Analysis with Geospatial Analytics for KNIME
Instructor:
- Lingbo Liu, Center of Geographic Analysis, Harvard University

II. Develop GeoAI Tools using ChatGPT and Python Packages
Instructors:
- Siqin Wang, Spatial Sciences Institute, University of Southern California
- Yongze Song, School of Design and the Built Environment, Curtin University

III. Cloud Computing with Google Earth Engine and GeoAI
Instructors:
- Xiao Huang, Department of Environmental Sciences, Emory University
- Qiusheng Wu, Department of Geography & Sustainability, University of Tennessee

IV. Geospatial Methods and Tools for the Spatial Assessment of Healthcare Accessibility
Instructors:
- Fahui Wang, Graduate School, Louisiana State University
- Changzhen Wang, Department of Geography, University of Alabama
- Mengxi Zhang, Carilion School of Medicine, Virginia Tech

5:00 PM-7:00 PM KNIME Data Connect
Enrich Data Analytics with GenAI / KNIME Data Connect

Location: Virginia Tech Research Center – Arlington, 900 N Glebe Rd, Arlington, VA 22203

5:10 PM - 5:40 PM - Talk 1: Detecting Frauds in Investment Contracts - Enrich Data Analytics with GenAI by Elisabeth Richter

5:40 PM - 6:10 PM - Talk 2: Leveraging Geospatial Analytics in KNIME by Prof. Mengxi Zhang

6:10 PM - 7:00 PM - Refreshments and Networking

DAY 2 - Tuesday, July 23, 2024 (On Site and Online), Plenary Session,Room 134	
8:30 AM	Registration and continental breakfast
9:00 AM	**Welcome Address** Gregory Washington, George Mason University Daniel Sui, Virginia Tech Andre Marshall, George Mason University Facilitator: Phil Yang, George Mason University; Mengxi Zhang, Virginia Tech
9:30 AM	**Keynote:** John Wilson, University of South California Facilitator: Siqin Wang, University of South California
10:00 AM	**Keynote: GeoAI, the Social Sciences, and Ethics** Michel Goodchild, UC Santa Barbara Facilitator: Peter Kedron, UC Santa Barbara
10:30 AM	**Coffee Break**
11:00 AM	**A-1 Plenary Vision Panel: Vision and Impact of Spatiotemporal Data Sciences** Moderator: Michael Goodchild, UCSB **AI is transforming urban observation, imaging, mapping, and analysis** Qihao Weng, The Hong Kong Polytechnic University **Advancing Social Sciences with Spatiotemporal Data Sciences** Daniel Sui, Virginia Tech **Advancing Ecosystem Services Assessment Through Geospatial Artificial Intelligence (GeoAI): A Comprehensive Review and Future Directions** Hao-Yu Liao, University of Florida **Enabling Societal Challenge Solutions with Spatiotemporal Data Sciences** Chaowei Yang, George Mason University
12:00 PM	**Lunch Break: First Floor Classrooms** **134/135: Keynote: Daniel Q. Duffy, NASA Goddard CISTO Head**
DAY 2- Tuesday, July 23, 2024, Parallel Track 1, Room 134	
1:00 PM	**Session 1 (118): PH-1-i, Advances in Public Health** **Chair:** Fahui Wang, Louisiana State University

	Geospatial Patterns in Brain and Nervous System Cancer Incidence and Mortality Rates Every 5 Years from 1999-2018, and the Relationship between Mortality and Gender from 2014-2018 in the United States Grace Christensen, Brigham Young University **Graph Neural Network for Spatial Network Community Detection in Healthcare Service Area Delineation** Lingbo Liu, Harvard University **Pediatric Oral Health Service Access in Racial/Ethnic Minority Neighborhoods: A Geospatial Analysis in the District of Columbia** Meirong Liu, Howard University - Washington, DC **Scaling Up and Down in Cancer Data Analysis** Fahui Wang, Louisiana State University **Beyond Maps: Developing a conversational AI-based data dashboard for public health policymakers.** Zach Sherman, Virginia Polytechnic Institute and State University
2:35 PM	**Coffee Break**
3:05 PM	**Session 2: W-1-i, FAIR and Replicability** **Chair:** Tao Hu, Oklahoma State University **KNIME & AI - An Overview of KNIME's AI Functionalities** Elisabeth Richter, KNIME Inc. **Replicable Spatial Data Analysis with Geospatial Analytics for KNIME** Xiaokang Fu, Harvard University **Automating Geographic Mapping from Descriptive Texts: A Novel Approach** Zifu Wang, George Mason University **FAIR Principles in Action: A Geocomputational Workflow Engine (GWE) for Reproducible and Replicable Studies** Tao Hu, Oklahoma State University **Improving user interaction for labeling workflow** Evelyn Fontaine, George Mason University
DAY 2- Tuesday, July 23, 2024, Parallel Track 2, Room 120	
1:00 PM	**Session 3: B-1-i, Advances in Computational Urban Science** **Chair:** Xinyue Ye, Texas A&M University **Platform capitalism-based land management model for smart cities** Parlewar Prafulla, School of Planning and Architecture, New Delhi, India

	Telework context and Senior Entrepreneurship Ting Zhang, University of Baltimore **Implications for Spatial Non-stationarity and the Neighborhood Effect Averaging Problem (NEAP) in Green Inequality Research: Evidence from Three States in the U.S.** Sophiya Gyanwali, Virginia Tech **Disparities in Recreational Use of Urban Parks: A Big Data Approach** Siddhartha Bora, West Virginia University **Social Cyber Vulnerability Index (SCVI) and Geospatial Analysis to Mitigate Cyber Threats in Social Spaces** Jin-Hee Cho, Computer Science Department, Virginia Tech **Promoting Urban Informatics Plus: Practices and Strategies** Xinyue Ye, Texas A&M University
2:35 PM	**Coffee Break**
3:05 PM	**Session 4: CLT-1-i, Classification, labeling and training data** **Chair:** Theodore Spanbauer, George Mason University **Cycling Infrastructure Evaluation: Applying Deep Learning Methods to Categorize Bike Lanes in Virginia State** Lawal Abdul-Azeez, Virginia Tech **ClassX: Automatic Image Labeling Tool** Theodore Spanbauer, George Mason University **High urban flood risk and no shelter access disproportionately impacts vulnerable communities in the USA** Fatemeh Janatabadi, George Mason University **Innovative Approaches to Automated Data Labeling and CNN Implementation** Rakshita Chidananda, George Mason University
DAY 2- Tuesday, July 23, 2024, Parallel Track 3, Room 121	
1:00 PM	**Session 5: C-1-i, Air Quality Analyses** **Chair:** Meghan Albritton, Virginia Tech **Associations Between Surface Mine Density and Respiratory Health in Central Appalachia** Meghan Albritton, Virginia Tech **Optimizing the Downloading, Uploading, and Serving of Air Quality In-situ Sensor data using various techniques** Jiakang Liu, George Mason University

	A Systematic Study of Popular Packages and AI/ML Models for Calibrating in-situ Air Quality Data: An example with Purple Air Sensors Smith Seren, George Mason University **Indonesia's Air Quality Crisis: A Holistic Approach to PM2.5 Prediction and Mitigation Scenario in Malang** Ardiyanto Gai, Dekka Putra, Institut Teknologi Nasional Malang
2:35 PM	**Coffee Break**
3:05 PM	**Session 6: C-2-i, Air Quality Prediction and Exposure Analyses** **Chair:** Junghwan Kim, Virginia Tech **Enhancing PM2.5 Prediction through Multisource Fusion of Aerosol Data Using Seq2Seq Encoder-Decoder Models** Anusha Srirenganathan Malarvizhi, George Mason University **The Air We Breathe: GeoAI Tools for Accurate and Timely Air Quality Analysis across North America** Tayven Stover, George Mason University **AirWise: A Geo-Intelligent Deep Learning Framework for High-Resolution PM2.5 Prediction** Phoebe Pan, George Mason University **A new green space exposure index utilizing AI methods and an eye-tracking device** Junghwan Kim, Virginia Tech
DAY 2- Tuesday, July 23, 2024, Parallel Track 4, Room 311	
1:00 PM	**Session 7: U-1-i, Bias and Uncertainty** **Chair:** Francisco Rowe, University of Liverpool **What do we know about the biases and representation in human mobility data extracted from digital platforms?** Francisco Rowe, Geographic Data Science Lab, University of Liverpool **Uncertainty Quantification for PM2.5 Calibration of Low-Cost PurpleAir Sensors Against EPA Standards** Kaylee Smith, George Mason University, University of Michigan Ann Arbor **Graph Convolutional Networks for spatial interpolation of correlated data** Marianne ABEMGNIGNI NJIFON, The Institute for Mathematical Stochastics - The University of Goettingen **Good Evidence – Sources of Bias in Big Spatiotemporal Data** Peter Kedron, University of California Santa Barbara

	Exploring the Spatiotemporal Dynamics of Google Trends Data: An Application in Estimating Childcare Demand Sean Reid, University of California, Santa Barbara **Generative AI tools can enhance climate literacy but must be checked for biases and inaccuracies** Atkins Carmen, Virginia Tech
2:35 PM	**Coffee Break**
3:05 PM	**Session 8: PLP-1-i, Positioning, place and location** **Chair:** Shashank Karki, Virginia Tech **Sudan Research** Ahmed Samir, George Mason University **Place Identity: A Generative AI's Perspective** Keemoon Jang, MIT Senseable City Lab **Tracking Human Movement Indoors Using Terrestrial Lidar** Shashank Karki, Virginia Polytechnic Institute and State University **Replicable GPS Data Processing Workflow Using KNIME** Will Jones, Harvard University and Virginia Tech **Intelligent system based on Knime for detecting Potholes in Morocco roads: Case of El Jadida City** Mifdal Yassine, Aaroud Abdessadek, Tounsi Yassine, University of Chouaib Doukkali, El Jadida - Morocco
DAY 2- Tuesday, July 23, 2024, Parallel Track 5, Room 128	
1:00 PM	**Session 9: D-1-i, Large language model** **Chair:** Zhaoya Gong, Peking University Shenzhen, and Hongxu Ma, Google Inc. **Reading remote sensing imagery like reading a text document: how can pretrained vision-language models assist geospatial pattern mining from imagery?** Xiao Huang, Emory University **Optimizing LLM Classification with BERT and Targeted Data Preparation** Yahya Masri, George Mason University **How Western donors allocate Official Development Assistance: New evidence from a Natural Language Processing approach.** Daniel Benson, King's College London

	CartoAgent: a multi-modal large language model empowered multi-agent mapping framework and its application in map style transfer and evaluation Zhaoya Gong, School of Urban Planning and Design, Peking University Shenzhen Graduate School **Comparing the spatial querying capacity of ChatGPT-3.5, ChatGPT-4, and Gemini: An empirical study of 3,108 U.S. counties** Andrea Renshaw, Virginia Polytechnic Institute and State University **The Rise of the Data Science Assistant: LLM Agents in Action** Hongxu Ma, Google Inc.
2:35 PM	**Coffee Break**
3:05 PM	**Session 10: HA-1-i, Accessibility** **Chair:** Changzhen Wang, The University of Alabama **Unraveling transit service and land use components of the socio-spatial inequality of access** Fatemeh Janatabadi, George Mason University **Potential and Revealed Accessibility to Cancer Care in the United States and The Johns Hopkins Sidney Kimmel Comprehensive Cancer Center** Michael Desjardins, Johns Hopkins Bloomberg School of Public Health **Predicting Electric Load on Electric Vehicle Charging Stations using Machine Learning,** Louis Sanchez, George Mason Univ. **Overlapping cancer service areas: Delineation and implications** Changzhen Wang, The University of Alabama
DAY 2- Tuesday, July 23, 2024, Parallel Track 6, Room 312	
1:00 PM	**Session 11: FMS-1-i, Foundation models and spatially-explicit AI** **Chair:** Gengchen Mai, University of Texas at Austin **Advancing Decentralized Control in Swarm Robotics with Spatio-Temporal Graph Neural Networks** Chang-Tien Lu, Virginia Tech **Toward Geo-Foundation Models with Spatially-Explicit and Knowledge-Guided Learning** Yiqun Xie, University of Maryland **TorchSpatial: A Location Encoding Framework and Benchmark for Spatial Representation Learning** Gengchen Mai, University of Texas at Austin

	Using a bias-variance trade-off to model multiscale neighborhood effects across spatial supports Taylor Matthew Oshan, University of Maryland
2:35 PM	**Coffee Break**
3:05 PM	**Session 14: SDL-1-i, Spatial Data Lab: Platform and Network for Spatiotemporal Data Science** **Chair:** Chaowei Yang, George Mason University **Structure and Strategy** Wendy Guan, Harvard University; Shuming Bao, Future Data Lab **Development: Data, Tool and Case Studies** Lingbo Liu and Xiaokang Fu, Harvard University **Affiliate Lab Program** Mengxi Zhang, Virginia Tech; Xinyue Ye, Texas A&M University **Internship and Fellowship Research Program** Siqin Wang, University of South California; Xiao Huang, Emory University **Research Collaboration and Network Development** Yongze Song, Curtin University; Ting Zhang, University of Baltimore **Discussants:** ● Peter Keton, University of California at Santa Barbara ● John Wilson, University of South California
DAY 3- Wednesday, July 24, 2024 (Online only)	
9:00 AM	**Recap of DAY 2 and Overview of DAY 3** Mengxi Zhang, Virginia Tech
9:05 AM	**Keynote:** Krzysztof Janowicz, University of Vienna & UC Santa Barbara Facilitator: Daniel Sui, Virginia Tech
9:30 AM	**Plenary Panel: Digital Twin and Spatiotemporal Data Science** **Facilitator**: Daniel Sui, Virginia Tech & Chaowei Yang, George Mason University ● Jacqueline Le Moigine, NASA AIST ● Xinyue Ye, Texas A&M University ● James Kinter, George Mason University ● Pierre Goovaerts, Chief Scientist at BioMedware
11:00 AM	**Break**

11:15 AM	**Session 13: A-2-o, Spatiotemporal Data Science Vision** **Chair:** Lingbo Liu, Harvard University **Geodesign in the Era of Artificial Intelligence** Tianchen Huang, Texas A&M University **Adaptation of Telecoupling Toolbox – ArcGIS Toolbox into KNIME: Enhancing Accessibility and Reproducibility in Studying Socioeconomic-Environmental Interactions** Nan Jia, Michigan State University **Developing Open-access datasets from private Big Data Repositories: Challenges and Opportunities** Jack Hayes, Harvard Center for Geographic Analysis **Uncertainty and Replicability of GeoAI Models on Spatially Varying Effects: A Synthetic Data Case Study** Tian Tian, Harvard University & Wuhan University
11:15 AM	**Session 14: B-2-o, Economic analyses** **Chair:** Rama Martin, The World Bank **Spatial Econometric Analysis of the Impact of Health Infrastructure on TBC Patients: Study Case in Indonesia Provinces Level** Yessi Rahmawati, Airlangga University **GeoAI-driven Location-Manpower Optimization for Efficient Resource Allocation in the BFSI Sector** Prageet Aeron ; Rohit Sindhwani ; Nakul Gupt ; Sneha Dhyani Bhatt; Sangeeta Shah Bharadwaj, Management Development Institute, Gurgaon, India **Measuring global economic activity using air pollution** Rama Martin, The World Bank **The Impact of Highway Access on Industrial Coagglomeration** Minjia Guo, University of Glasgow **Global Public Sentiment on Decentralized Finance: A Spatiotemporal Analysis of Geo-tagged Tweets from 150 Countries** Luyao Zhang, Duke Kunshan University

11:15 AM	**Session 15: C-3-o, Climate Change: Urban Heat Stress** **Chair:** Cong Cao, Caltech **A Deep Learning approach to Estimate Near Surface Level NO2 Concentration using High Resolution Remote Sensing Observations** Theodore Trefonides, George Mason University **Climate change increases air pollution and heating demands in Norwegian cities: A deep learning-based analysis** Cong Cao, Caltech **Leveraging GeoAI to Analyze Heat Exposure Patterns and Hospitalizations in Texas** Ehsan Foroutan, Oklahoma State University **Analyzing Spatial-Temporal Patterns and Inequalities in Cycling Resilience to Extreme Heat** Wenjing Gong, Texas A&M University **Mitigating extreme heat by integrating human perception in digital twins** Yuning Ye, Texas A&M University **Prediction of Thermal Comfort in Nature Conservation Area Based on Multiple Machine Learning Models and Social Media Data** Jun Yang, Virginia Tech
11:15 AM	**Session 16: OS-1-o, Open Source Science** **Chair:** Xintao Liu, Hong Kong Polytechnic University **CONNECT: Open-source planning models for Next-generation Equitable and efficient Communities and Transportation** Xuesong (Simon) Zhou, Arizona State University **GIS-KG: building a large-scale hierarchical knowledge graph for geographic information science** Jiaxin Du, Grand Valley State University **An AI-enabled Geospatial Platform for Smart Mobility of People with Disabilities (PwDs)** Xintao LIU, Hong Kong Polytechnic University **Flying High with GIS: Drones for Spatiotemporal Modeling Education** Yang Bo, San Jose State University
12:30 PM	**Lunch Break**

1:30 PM	**Session 17: W-2-o, Computing and workflow** **Chair:** Lingbo Liu, Harvard University **Computing Infrastructure in Spatiotemporal Research** Joseph Rogers, George Mason University **Containerizing AI-Driven Image Labeling Tool for Efficient Research Deployment** Gian Sung, George Mason University **Adaptation of Telecoupling Toolbox - ArcGIS toolbox into KNIME: Enhancing Accessibility and Reproducibility in Studying Socio-economic-Environmental Interactions** Nakul Gupta and Nan Jia, Management Development Institute, Gurgaon, India and Michigan State University **Modularizing legacy flask app to improve server side module workflow** Hassan Yousef, George Mason University
3:00 PM	**Break**
3:15 PM	**Session 21: F-1-o, Flooding** **Chair:** Wenyu Zhang, Texas A&M University and National University of Singapore **3D Flooded Area Modeling through Multi-modal Generative AI** Shoujia Li, Texas A&M University **Development of a Web-Based Flood Monitoring and Assessment System Utilizing Satellite Observation via the Google Earth Engine Platform** WENYU ZHANG, Texas A&M University and National University of Singapore **Understanding the spatial disparity in socio-economic recovery of coastal communities following typhoon Meranti** Shengping Ding, University of Copenhagen
1:30 PM	**Session 18: MM-1-o, Modeling and methods** **Chair:** Hanchen Yu, HKUST(GZ) **Deep investigations on the autocorrelation feature of spatial data** Zehua Zhang, Curtin University **Exploring Multiscale Spatial Interactions: Multiscale Geographically Weighted Negative Binomial Regression** Hanchen Yu, HKUST(GZ) **A multivariate spatiotemporal ARCH model** Philipp Otto, School of Mathematics and Statistics

	Research on Measuring Industrial Structure Similarity between regions based on Wasserstein distribution Algorithm Chen Lu, Southeast University **Improving short-term bike sharing demand forecast through an irregular convolutional neural network** Xinyu LI, Texas A&M University
3:00 PM	**Break**
3:15 PM	**Session 22: CLT-2-o, Image Classification, Labeling and Training data** **Chair:** Weishan Bai, Texas A&M University **Neuro-Cognitive Enhancement of Remote Sensing Image Classification** Weishan Bai, Texas A&M University **Automated Farmland Segmentation Using Advanced Satellite Imagery for Precision Agriculture** Espoir MWUNGURA NGABO, University of Rwanda **Urban weather prediction in Houston Metro area: an evaluation of the urban weather generator model** Cuiling Liu, Texas A&M University **Analysis of Multispectral and Hyper-spectral Imaging in Convolution Neural Networks** Shyra LaGarde, Georgia Institute of Technology
1:30 PM	**Session 19: HA-2-o, Health Accessibility & Analytics** **Chair:** Tianyu Su, Harvard University **Enhancing Neighborhood Walkability for the Elderly: Assessing and Visualizing a Multi-Criteria Spatial Quality Model with Visual AI and Big Geospatial Data** Tianyu Su, Harvard University **Uncovering Healthcare Accessibility Dynamics: A Study of Patients' Travel Behavior and Urban-Rural Distance Decay in the United States** Yaxiong Shao, Northern Illinois University **Measuring Spatial Inequalities in Accessibility to Water Point Sources Among the Households in Sibi, Ghana** Kanjin Kingsley & Minxuan Lan, The University of Toledo **Factors Impacting Pharmacy Success in Lowndes County, Georgia** Bennett, Cameron and Lu, Jia, Valdosta State University

	Unraveling varying spatiotemporal patterns of dengue and associated exposure-response relationships with environmental variables in Southeast Asian countries before and during COVID-19 Wei Luo, National University of Singapore **Integrating Spatial Data Science in One Health Research: A Case Study of Human Leptospirosis in southern Chile** Anni Yang, University of Oklahoma
3:00 PM	**Break**
3.15 PM	**Session 23: S-1-o, Smart cities and built environment** **Chair:** Hanlin Zhou, University of Toronto **Explainable machine learning for understanding the associations of shared e-scooter–public transport integration with built environment and socio-demographics** Pengxiang Zhao, GIS Centre, Department of Physical Geography and Ecosystem Science, Lund University **Assessing the health impact and disparities of shifting from driving to active transportation: A case study of Houston, Texas** Chunwu Zhu, Texas A&M University **Correlation and causality between the built environment and traffic congestion: A case study of New York City** Weihua Huan, Tongji University **Using GeoAI to Understand the Associations between Built Environment and Active Transport** Hanlin Zhou, University of Toronto
1.30 PM	**Session 20: PCS-1-0, Public and cyber safety** **Chair:** Minglei Liao, The Hong Kong Polytechnic University **Measuring perceived racial heterogeneity and its impact on crime: an ambient population-based approach** Xin Gu, University of Cincinnati **Street Crime Prediction Using Mass Transit Infrastructures and Spatial-Temporal Machine Learning Method** Xiangyu Ren, San Jose State University **Digitalization era: Investigating the spatial interplay between cyber human activity and economy with a hierarchical framework** Minglei Liao, The Hong Kong Polytechnic University

	STGraph: A Spatial-Temporal Graph Approach Using Urban Infrastructure Data Siji Chen, Virginia Tech **Migrant-native Disparities in Neighborhood Satisfaction in the Netherlands: the Role of Subjective Perceptions on Safety and Population Composition** Weiyi Cao, Wageningen University & MIT
3:00 PM	**Break**
3:15 PM	**Session 24: GAI-1-o, Geo for AI vs. AI for Geo: When GeoAI Meets Spatiotemporal Analysis and Modeling** **Chair:** Di Zhu, University of Minnesota **On the Interpretability and Explanability of GeoAI for Spatiotemporal Analysis** Ziqi Li, Florida State University **Talk about GeoAI: from the World Generation Process** Peng Luo, MIT Senseable City Lab **Identifying built environment factors influencing driver yielding behavior at unsignalized intersections: A naturalistic open-source dataset collected in Minnesota** Tianyi Li, University of Minnesota **Geospatial uncertainty modeling in GeoAIGuofeng (N)** Guofeng Cao, University of Colorado Boulder **Learning Social Meta-knowledge for Nowcasting Human Mobility in Disaster** Zhaonan Wang, NYU Shanghai
4:30 PM	**Closing Remark** ● Chaowei Yang, George Mason University ● Shuming Bao, Future Data Lab

Pre-symposium Workshop on Spatiotemporal Innovation and GeoAI Applications

Time: July 22, 2024 (Monday), one day before the Symposium on Spatiotemporal Data Science (July 23-24, 2024)

Location: Virginia Tech Research Center – Arlington, 900 N Glebe Rd, Arlington, VA 22203

Description of the Workshop

This workshop aims to provide a comprehensive overview of the potential and challenges of some cutting-edge technologies in advancing geospatial science and applications, fostering a deeper understanding and encouraging further exploration and innovation in the field. The workshop will introduce some new tools and applications of GeoAI built on the workflow technology as well as their applications in social science and public health. Participants will learn the GeoAI-based methodology for geospatial analysis, GeoAI tools and packages for spatial data analysis, as well as their applications.

Topics: 6 hours

- Replicable Data Analysis with Geospatial Analytics for KNIME
- Develop GeoAI Tools using ChatGPT
- Cloud Computing with Google Earth Engine and GeoAI
- Geospatial Methods and Tools for the Spatial Assessment of Healthcare Accessibility

Abstracts and Instructors:

I. Replicable Data Analysis with Geospatial Analytics for KNIME

This workshop will introduce the recent development of workflow technology for replicable spatial data analysis. The topics include: (1) Introduction to KNIME, a free tool for workflow data analysis; (2) Introduction to Geospatial Analytics Extension for KNIME; (3) GeoAI data analysis with KNIME; (4) Case studies of GeoAI and KNIME applications for environmental and socioeconomic studies with big data.

Instructor:

- Lingbo Liu, Center of Geographic Analysis, Harvard University

II. Develop GeoAI Tools using ChatGPT and Python Packages

The first half of this session will introduce GeoLocator - a GeoAI tool re-developed from ChatGPT to detect the location based on the image that was input into the ChatGPT. It will more broadly introduce how to reformulate ChatGPT for geographic studies and research. The second half of this session will introduce popular GeoAI tools and packages and their applications in geospatial studies.

Instructors:

- Siqin Wang, Spatial Sciences Institute, University of Southern California
- Yongze Song, School of Design and the Built Environment, Curtin University

III. Cloud Computing with Google Earth Engine and GeoAI

This workshop explores the integration and applications of cloud computing technologies, specifically Google Earth Engine, with Geographic Artificial Intelligence (GeoAI) to address complex spatial problems.

The presentation aims to showcase how cloud computing offers scalable and efficient computing resources for processing vast amounts of geographic data, enabling researchers, scientists, and developers to perform advanced spatial analysis and machine learning tasks without the need for extensive hardware infrastructure. Case studies or examples are provided to illustrate the practical applications of combining Google Earth Engine and GeoAI.

Instructors:

- Xiao Huang, Department of Environmental Sciences, Emory University
- Qiusheng Wu, Department of Geography & Sustainability, University of Tennessee

IV. Geospatial Methods and Tools for the Spatial Assessment of Healthcare Accessibility

The workshop will introduce some recent development of methodology and technology for the spatial study of health accessibility. The topics include: (1) Overview of the issues on spatial accessibility, (2) Two-Step Floating Catchment Area (2SFCA) Method, (3) Generalized 2SFCA (G2SFCA), (4) Inverted 2SFCA (i2SFCA) method for estimating potential crowdedness in facilities, (5) Two-Step Virtual Catchment Area (2SVCA) method for measuring accessibility via internet or virtual accessibility, and (6) the ArcGIS toolkit and KNIME workflows for automated implementation of a case study of various accessibility measures for primary care physicians in Baton Rouge metropolitan region.

Instructors:

- Fahui Wang, Graduate School, Louisiana State University
- Changzhen Wang, Department of Geography, University of Alabama
- Mengxi Zhang, Carilion School of Medicine, Virginia Tech

Committees

Executive Committee

- Chaowei Yang, George Mason University *(Co-Chair)*
- Shuming Bao, Future Data Lab *(Co-Chair)*

Steering Committee

- Daniel Sui, Virginia Tech *(Co-Chair)*
- Andre Marshall, George Mason University *(Co-Chair)*
- Chaowei Phil Yang, George Mason University
- Michael Goodchild, UCSB
- Wendy Guan, Harvard University
- Shuming Bao, Future Data Lab
- Dieter Pfoser, George Mason University
- Kathleen Stewart, University of Maryland
- Shashi Shekhar, University of Minnesota
- John Wilson, University of South California
- Daniel Brown, University of Washington
- Michael Berthold, KNIME
- Akiyuki Kawasaki, University of Tokyo
- Shaowen Wang, University of Illinois at Champaign Urbana
- Daniel Q. Duffy, NASA
- Fernando Mirralles, George Mason University
- May Yuan, NSF
- Xinyue Ye, Texas A&M University
- Chang-Tien Lu, Virginia Tech

Programming Committee

- Siqin Wang, Uni of South California *(Co-Chair)*
- Peter Kedron, UCSB *(Co-Chair)*
- Xiao Huang, Emory University (Co-Chair)
- Mengxi Zhang, Virginia Tech
- Lingbo Liu, Harvard University
- Tobias Koetter, KNIME
- Junghwan Kim, Virginia Tech
- Di Zhu, University of Minnesota
- Emmanuel Fundisi, Human Sciences Research Council, South Africa
- Yongze Song, Curtin University, Australia
- Qiusheng Wu, University of Tennessee
- Xintao Liu, Hong Kong Polytech University
- Francisco Rowe, University of Liverpool, UK
- Bernd Resch, University of Salzburg & Harvard University
- Minxuan Lan, University of Toledo
- Tao Hu, Oklahoma State University
- Ting Zhang, University of Baltimore
- Wenying Ji, George Mason University
- Yingjin Cui, Northern Virginia Community College
- Jia Lu, Volda State University
- Yiqun Xie, University of Maryland – College Park
- Matt Rice, George Mason University
- Alireza Ermagun, George Mason University
- Ruixin Yang, George Mason University
- Elisabeth Richte, KNIME

Local Organizing Committee

- Mengxi Zhang, Virginia Tech *(Co-Chair)*
- Fengxiu Zhang, George Mason University (*Co-Chair*)
- Lingbo Liu, Harvard University *(Co-Chair)*
- Minni Song, George Mason University (*Secretary*)
- Ting Zhang, University of Baltimore
- Xiaokang Fu, Harvard University
- Seren Smith, George Mason University
- Zifu Wang, George Mason University
- Shiyang Ruan, George Mason University
- Yi Wei, George Mason University
- Mengfei Xin, George Mason University
- Mailun Zhang ,George Mason University
- Jiaman Li, George Mason University

Website Committee

- Zifu Wang, George Mason University (Chair)
- Jacob Cain, George Mason University
- Joseph Rogers, George Mason University
- Shuming Bao, Future Data Lab
- Sisi Wang, Harvard University
- Mengxi Zhang, Virginia Tech
- Xiao Huang, Emory University
- Lingbo Liu, Harvard University
- Wendy Guan, Harvard University

Call for Submissions: " Big Earth Data for Climate Studies"

A Special Issue of The Journal of Remote Sensing

The recent advancement of big data analytics on new observing systems for collecting data, machine learning and new computing architecture for enabling analytics and transfer/interpretive learning for bridging the traditional geophysical modeling and machine learning. This Special Issue invites research, review, vision and case study papers on the use of advanced computing techniques, cutting-edge big data analytics, machine learning methods, and any new tools to understand various dimensions of climate change from regional to global scale. Topics include, but are not limited to, the following:

- Big Earth data collection for climate change;
- Preprocessing for analytical-ready data;
- Big Earth data management in a FAIR fashion (find, access, interoperability, and replicable);
- Geospatial data processing;
- Geophysical simulation based on big data;
- Big data visualization and presentation for decision support;
- Building digital twins with big Earth data;
- Open source for climate change;
- New computing methods for climate change;
- Climate change use cases, such as sea level rise, sea ice change, global warming, flooding, wildfire, hurricane, drought, etc.;
- Climate justice – impacts of climate change due to rising sea levels, sunken islands, climate refugees, urban heat island, air quality, health effects, fires, etc.

Guest Editors:

- Prof. Dr. Chaowei Yang, George Mason University
- Dr. Daniel Q. Duffy, NASA

Manuscript Submission Information

Submitted manuscripts should not have been published previously, nor be under consideration for publication elsewhere (except conference proceedings papers). All manuscripts are thoroughly refereed through a single-blind peer-review process. Please visit the Instructions for Authors page before submitting a manuscript. ***The Article Processing Charge (APC) for this special issue will be waived for the papers submitted to the symposium***, which is a saving of 2700 CHF (Swiss Francs). For more information about submission, please visit https://www.mdpi.com/journal/remotesensing/special_issues/K5OCX36907.

Deadline for Submissions: November 30, 2024

Call for Submissions: "Replicability and Reproducibility of Geospatial Artificial Intelligence (GeoAI) Models and Their Application in Social Science"

A Special Issue of The Journal of Urban Informatics

This special issue aims to delve into the burgeoning field of GeoAI, focusing on its applications in social sciences. We are particularly interested in contributions that examine the replicability and reproducibility of GeoAI models, shedding light on their effectiveness and dependability in social science research. Our goal is to foster interdisciplinary dialogue, bridging theoretical and empirical approaches in the realm of GeoAI. We welcome submissions that demonstrate how GeoAI models can be used to tackle complex issues in social science research.

The potential submissions should critically analyze the application of GeoAI in various social science disciplines, including sociology, economics, political science, human geography, and more. Papers that utilize innovative methodologies, offer novel theoretical insights, or present case studies demonstrating the application of GeoAI in real-world social science research with replicable data and code are particularly encouraged.

In addition to regular research papers, we welcome a variety of scholarly contributions related to GeoAI in social science. These include talk summaries, discussion collections, and opinions, submitted in the formats of review papers, perspective papers, or commentary articles. The topics may include:

- GeoAI Model applications in social science research
- Theoretical discussions on GeoAI's role in understanding social phenomena
- Methodological advancements in GeoAI for social science
- Reviews of trends and future directions in GeoAI and social science
- Cross-disciplinary approaches involving GeoAI and fields like sociology, economics, or political science
- Ethical considerations in using GeoAI in social science
- GeoAI used in the education of social science
- GeoAI integrating with ChatGPT, Generative AI and other large language models (LLM) in social science

Special Requirements for GeoAI Model Papers

For submissions focusing on GeoAI models, authors are required to provide:

Data: Original or sample data from the study;

Workflow: Executable workflows based on code of Python, R, or KNIME workflows that can be replicable in future studies.

These materials are crucial for ensuring the replicability and reproducibility of the research.

Submission Process:

Manuscripts should be submitted through the journal's online system (www.editorialmanager.com/uinf/default.aspx). Please select this special issue in the "Additional Information" section during submission. ***The Article Processing Charge (APC) for this special issue will be waived for the papers submitted to the symposium.***

Deadline for Submissions: December 30, 2024

Call for Submissions: "Earth Observation and GeoAI for Social Science"

A Special Issue of Big Earth Data

GeoAI combines Geographic Information Systems (GIS) with Artificial Intelligence (AI), enabling social scientists to analyze spatial data with unprecedented accuracy and depth, while earth observation data have important strengths for social sciences as an important data source to quantify the change of urban space, human settlement, and economic development.

The importance of earth observations and GeoAI in social science lies in its ability to reveal the complex relationship between human behaviors and environment or even its causality and mechanism, enhance our understanding of spatial dimensions of social issues, improve policy-making, foster interdisciplinary collaboration, and drive technological advancements to be human-centered and resolve problems linking to population, community and society as a whole. The advances of GeoAI algorithms enable researchers to explore the confounders lying underneath the complexity of human-environment interaction. By leveraging the strengths of both GIS and AI, social scientists can address complex societal challenges more effectively and contribute to more informed and equitable decision-making processes.

This Article Collection invites original articles, review articles, data articles, and technical notes (all submissions are required to provide sharable datasets, codes, algorithms packages, workflow and software tools, publicly accessible by readers).

The main topic of "Earth Observation and GeoAI for Social Science" includes the two categories of subtopics as below:

Technical subtopics (earth observation data usage as the essential in the research design):

- GeoAI technical advances
- Generative GeoAI including ChatGPT, and other types of large language models
- GeoAI modeling and algorithms
- Machine learning, deep learning and neural network
- Natural language processing
- Computer vision
- Global and local models
- Remote sensing and GeoAI
- Earth observation data used in GeoAI

Disciplinary subtopics:

- Computation social science
- Human Geography
- Urban Geography

All manuscripts submitted to this Article Collection will undergo a full peer-review; the Guest Advisor(s) for this Collection will not be handling the manuscripts (unless they are an Editorial Board member). ***The Article Processing Charge (APC) for this special issue will be waived for the papers submitted to the symposium.***

The deadline for submitting manuscripts is 1 April 2025.

Spatial Data Lab Project Partners
http://sdl.gis.harvard.edu

Center for Geographic Analysis at Harvard University

The Center for Geographic Analysis (CGA) at Harvard University is housed by Harvard's Institute for Quantitative Social Science, and one of the research sites in the Spatiotemporal Innovation Center funded by the US National Science Foundation's Industry–University Cooperative Research Centers Program. Its core mission is to advance and support research and teaching in all disciplines across Harvard University with emerging geospatial technologies.

Future Data Lab

Future Data Lab (FDL) is designed for providing a new generation of data services with cutting-edge methodology and technology. The Future Data Lab is partnering with various academic and business partners on the following missions: spatial data services; development of tools for spatial data analysis; workflow-based spatial data case studies; and training programs for spatial data science.

China Data Institute

China Data Institute is one of the primary data providers for China data services in the US. Its missions are: to support research in the human and natural components of local, regional, and global changes; to promote quantitative research on China; to promote collaborative research in spatial studies; and to promote the use and sharing of China data in teaching and research worldwide.

Center for Spatiotemporal Thinking, Computing, and Applications at George Mason University

The spatiotemporal innovation center is funded by NSF in collaboration with agencies and industry. The center is targeted to build the national and international spatiotemporal infrastructure to advance human intelligence through spatiotemporal thinking, computer software and tools as well as spatiotemporal applications.

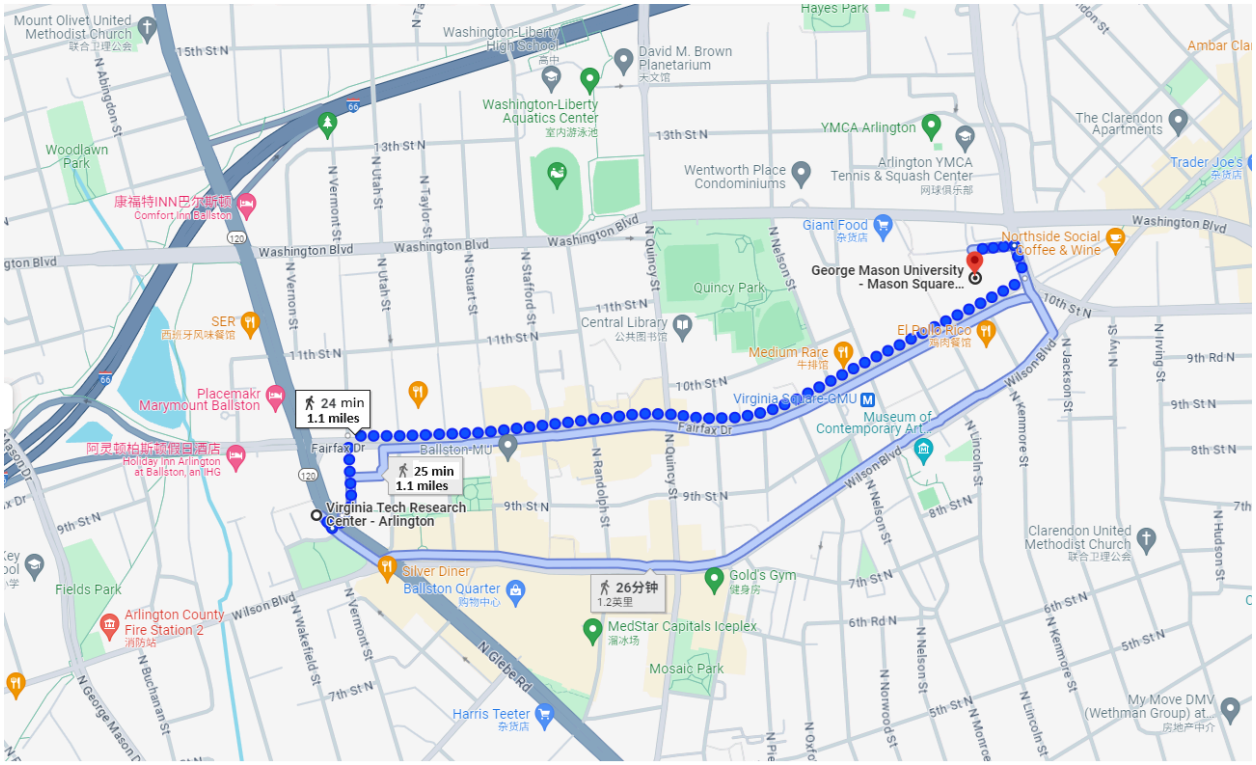
KNIME, Inc.

KNIME Analytics Platform is a free and open-source data analytics, reporting, and integration platform. KNIME empowers users to visually design and execute data flows using a modular system. Today it has a strong user community of 300,000+ across all industries and in over 60 countries.

Venue Map

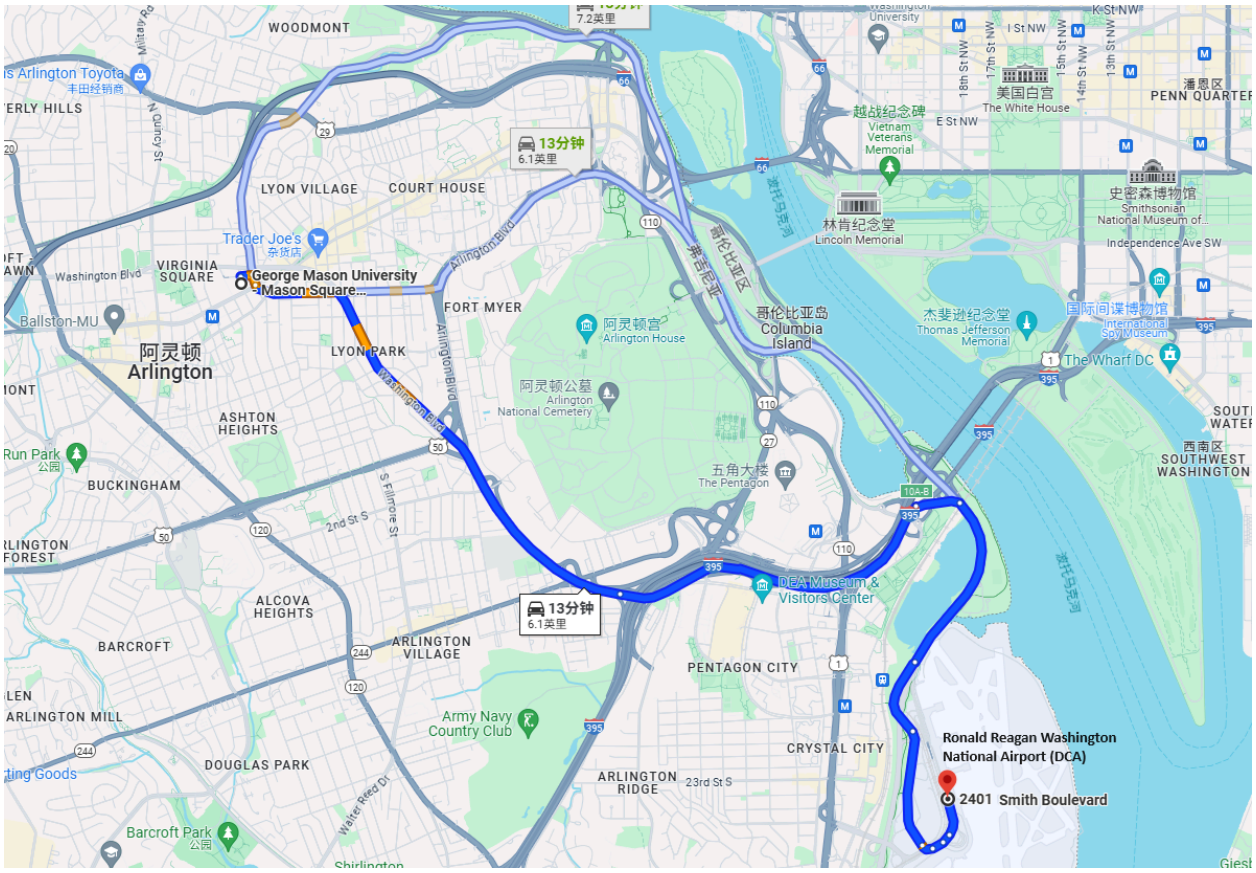
- **Pre-conf Workshop (July 22):** Virginia Tech Research Center, 900 N Glebe Rd, Arlington, VA
- **Onsite Symposium (July 23):** George Mason Square, 3351 Fairfax Dr, Arlington, VA

The pre-conference workshop on July 22: Virginia Tech Research Center, 900 N Glebe Rd, Arlington, VA 22203
The onsite symposium on July 23: George Mason Square, 3351 Fairfax Dr, Arlington, VA 22201



Transportation:

The Ronald Reagan Washington National Airport (DCA) is the closest airport (map), which is about 5 miles away from George Mason Square (Arlington).



Hotel Reservation Online:

- Agoda: https://www.agoda.com/
- Orbitz: http://orbitz.com
- Airbnb: https://www.airbnb.com/