The AMERICAN ASSOCIATION *of* GEOGRAPHERS
Spatial Analysis and Modeling Specialty Group Newsletter
2024 http://sam-aag.org/

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FROM THE CHAIR

Dear SAM members,

Hope your semester is going well. Many thanks to those who contributed to this edition of the SAM newsletter. I would like to express my special gratitude to Xin Feng, our newsletter editor, for putting together another wonderful SAM newsletter. Also, kudos to our dedicated members for making SAM one of the largest specialty groups of AAG. For those who would like to stay more engaged, you are encouraged to check out SAM activities and events via AAG community webpage and SAM website.

It is exciting that the 2024 AAG annual conference in Honolulu is approaching. As always, SAM will host and sponsor many events at the meeting. Among others, I would like to bring to your attention the following events.

Dr. Peter Rogerson from School of Geographical Sciences and Urban Planning, Arizona State University, will give the 2024 GA/SAM Plenary Lecture, titled, "Testing Hypotheses When You Have a Few Too Many". Dr. Rogerson is a member of the American Academy of Arts and Sciences, and a leading scholar in spatial statistics, disease surveillance, and demography. The lecture will take place on April 18th (Thursday) from 3:00 pm - 4:20 pm. You are also welcome to join the reception that follows the lecture.

SAM will host two John Odland student competition sessions on April 17th (Wednesday). You are invited to attend these student paper sessions and show your support. This year, we received a total of 22 submissions with 8 selected for the competition sessions. After a successful competition last year, we look forward to evaluating this year's high-quality papers. I would like to express special appreciation to Hyun Kim (University of Tennessee, Knoxville) for organizing the competition sessions and all the external reviewers for their time and hard work. These external reviewers are René Westerholt (Dortmund University), David Folch (Northern Arizona University), Jed Long (Western University), Wenwu Tang (University of North Carolina, Charlotte), Yujie Hu (University of Florida), Katarzyna Siła-Nowicka (University of Auckland), Atsushi Nara (San Diego State University), Junghwan Kim (Virginia Tech), Yingjie Hu (University of Buffalo), Xin Feng (University of Oklahoma), Yoomin Park (University of Connecticut), Levi Wolf (University of Bristol), Eric Delmelle (University of North Carolina, Charlotte) and Sangil Lee (Seoul National University).

Meanwhile, our SAM Business Meeting has been scheduled on April 19th (Friday) from 12:10 pm to 1:10 pm. You are all invited to attend the meeting. Winners of the John Odland Student Paper Award, Student Travel Award, Emerging Scholar Award, and Outstand Service Award will be announced at the business meeting.

As for the SAM board, Taylor Oshan and I will complete the three-year term service; two new members, Seda Şalap-Ayça (Brown University) and Jiannan Cai (Chinese University of Hong Kong), will join the board and Hyun Kim will become the next chair. I would like to take the opportunity to thank Taylor for his great contributions to the student paper competition by making it a more rigorous process, among many other endeavors. It has been a great honor for me to serve as the chair of SAM, working with a group of amazing people. Despite the challenges brought about by the pandemic during the first two years of my term, SAM continued sponsoring many sessions at the AAG annual conference, supporting students by providing travel and student paper awards, and recognizing our members' excellence. We have strengthened the connection between SAM and the Quantitative Methods Research Group (QMRG) of the Royal Geographical Society by planning collaborative workshops and other activities and submitting grant proposals to support these events. I would like to thank you all for your continued support.

I look forward to meeting/seeing you in Honolulu soon!

Best,
Daoqin Tong,

Chair, Spatial Analysis and Modeling Specialty Group
Professor, Arizona State University

Upcoming Event: 2024 AAG

As we are approaching the 2024 Annual meeting of AAG, we would like to highlight the news of the Spatial Analysis and Modeling (SAM) Specialty Group.

For 2024 AAG, individuals will have the opportunity to present and learn from the Annual Meeting in person and online.

Thank you for supporting the SAM Specialty Group community and we are looking forward to meeting you at AAG 2024.

SAM Announcements

2024 SAM Plenary Speaker
Dr. Peter Rogerson

Dr. Peter Rogerson
Professor
Geographical Sciences & Urban Planning
Arizona State University

We are pleased to announce that Dr. Peter Rogerson is selected for the 2024 SAM Plenary Lecture. Dr. Rogerson, a member of the American Academy of Arts and Sciences, joined Arizona State University in 2022. Among his awards are a Guggenheim Fellowship and a fellowship at the Center for Advanced Study in the Behavioral Sciences at Stanford University and he was named a SUNY Distinguished Professor at the University of Buffalo. His expertise includes demography, disease surveillance and spatial statistics.

Congratulations, Dr. Rogerson!

2023 SAM Outstanding Service Award
Dr. Rachel Franklin

Dr. Rachel Franklin
Professor
School of Geography, Politics, and Sociology
Newcastle University

Dr. Rachel Franklin is a Professor of Geographical Analysis in the Centre for Urban and Regional Development Studies (CURDS) and the School of Geography, Politics and Sociology at Newcastle University, theme lead for Spatial Analytics at Newcastle Data, Co-I for the EPSRC-funded Centre for Doctoral Training (CDT) in Geospatial Systems, and the University Lead for Newcastle for the Alan Turing Institute.

Dr. Franklin has a long and distinguished record of service to the *American Association of Geographers*, beginning as a student representative to SAM (1999-2002), then as Deputy Director (2007-2009), recently through the Population Specialty Group (2010-2017), and now as editor of *Geographical Analysis* (since 2017).

As editor of *Geographical Analysis,* she has been most directly involved in SAM through the sponsorship of the annual SAM Plenary. She has elevated the significance of the Plenary by inviting speakers to formalize their talks as an invited review, subsequently published in *Geographical Analysis*. Beyond this, her efforts as editor have helped to increase the visibility of SAM through other actions as well, including developing important special issues and improving time-to-appear for papers. With this journal being the primary outlet of many SAM members, this is noteworthy and significant in many important ways.

Congratulations, Dr. Franklin!

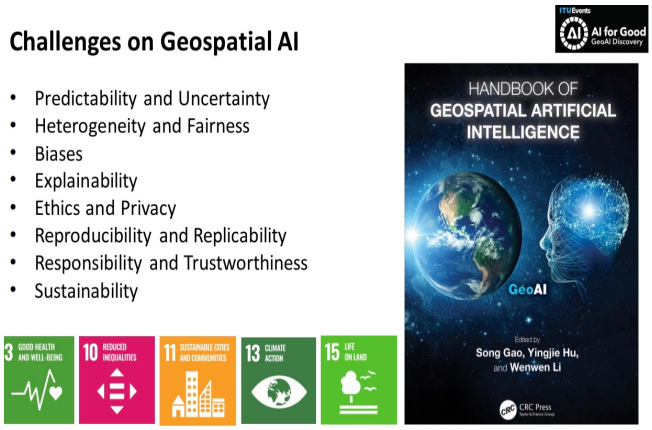
Editor's column

Meet Dr. Song Gao
2023 SAM Emerging Scholar

Dr. Song Gao
Associate Professor
Director of Geospatial Data Science Lab
University of Wisconsin-Madison

GeoAI for Sustainable Development Goals: The Handbook of Geospatial Artificial Intelligence

Geospatial Artificial Intelligence (GeoAI) is a rapidly evolving interdisciplinary field that integrates geospatial studies with AI advancements. Recently, The International Telecommunication Union (ITU) of the United Nations organized the AI for Good webinar about GeoAI Discovery. In this webinar the editors and authors of the recently published "**Handbook of Geospatial Artificial Intelligence**" discussed the fundamental concepts, methods, applications to address the Sustainable Development Goals (SDGs) and future perspectives of GeoAI.



The GeoAI Handbook is an excellent resource for educators, students, practitioners and decision-makers who are interested in utilizing AI technologies in a geospatial context. The GeoAI Handbook first reviews the historical roots for AI in geography and GIScience in Section I. Then, it introduces the foundations and recent developments in GeoAI methods and tools in Section II. These chapters cover topics on methodological foundations (deep neural networks and knowledge graphs), spatial image processing, spatial representation learning, intelligent spatial prediction and interpolation, spatial heterogeneity-aware deep learning, explainability in GeoAI, and spatial cross-validation for GeoAI models. Section III presents various GeoAI applications in cartography and mapping, transportation, humanitarian assistance, smart disaster response, public health, and urban sensing. Lastly, Section IV offers perspectives for future developments of GeoAI, including replicability and reproducibility, privacy and ethics, humanistic aspects, forward thinking on geospatial knowledge graph, and other future GeoAI directions.

The GeoAI advancements provide promising solutions to address some of the United Nations SDGs but also pose concerns. For example, Chapter 3 presents some of the fundamental assumptions and principles that could form the philosophical foundation of GeoAI and spatial data science. It highlights the sustainability issue for training GeoAI and foundation models that could cause substantial electricity energy and resource consumptions and generate equivalent carbon emissions. Therefore, we need to call for

Green AI for achieving the *SDG-13: Climate Action*. Chapters 13 and 14 discuss existing and prospective GeoAI tools to support humanitarian assistance practices and disaster responses using geospatial big data and machine learning methods, aiming to address the *SDG-10: Reduce Inequality* and *SDG-11: Sustainable Cities and Communities.* Chapter 15 focuses on using GeoAI for infectious disease spread prediction to address the *SDG-3: Good Health and Well-Being*.

AI technologies are advancing rapidly, and new methods and use cases in GeoAI are constantly emerging. As GeoAI researchers, we should not purely hunt for latest AI technologies but should focus on addressing geographic problems and solving grand challenges facing our society as well as achieving sustainable development goals. We also need research effort toward the development of responsible, unbiased, explainable and interpretable GeoAI models to support geographic knowledge discovery and beyond. This GeoAI Handbook was completed in the middle of 2023. While it cannot summarize all GeoAI research in this one handbook, it provides a snapshot of current GeoAI research landscape and helps stimulate future studies in the coming years.

Meet John Odland Student Paper Competition Winner (2023)

Changwha Oh
Ph.D. student
University of Tennessee, Knoxville
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My name is Changwha Oh, and I am a third-year Ph.D. student in the Department of Geography and Sustainability at the University of Tennessee, Knoxville. My research focuses on developing efficient solution approaches to location modeling by leveraging spatial properties in spatial optimization problems. Location models by mathematical programming to solve spatial optimization problems (such as *p*-median problems) have a large problem size resulting in significant computational burdens. To alleviate the computational burden in solving spatial optimization problems, various solution approaches have been proposed by previous studies, however, there has been a lack of attention to leveraging spatial properties in finding efficient solution approaches. I aim to fill this gap by investigating the geographical location behaviors in the location models by leveraging spatial properties such as distance and spatial autocorrelation and building an efficient model for the problem using spatial properties, to reduce the computational burden to solve the problem.

I was honored to have won the first place in the 2023 John Odland student paper competition with my paper titled 'An Efficient Solving Approach for the *p*-Dispersion Problem Based on the Distance-Based Spatially Informed Property', which will be a part of my dissertation. This paper proposed a new approach, named the distance-based spatially informed property method to reduce the problem size of the p-dispersion problem, which is derived from investigating the underlying spatial characteristics of the location behaviors of the problem in determining the optimal location. Ripley's *K*-function is utilized to determine the distance-based spatially informed property. Through the different types of synthesized point patterns, this paper demonstrated that the optimal solutions (locations) of the *p*-dispersion problems are associated with the spatial proximity among points by K-function. Based on the findings from the distance-based spatially informed properties, this study introduces a novel model for the *p*-dispersion problem, named the spatially informed *p*-dispersion model. The simulation-based experiments show that the proposed model reduces the size of the problems and improves computational performance in solving the problem.

In the future, I aim to keep my direction in applying spatial information to solving spatial

optimization problems efficiently. We name the solution approach using spatial information 'spatially informed solution approach', and the introduced paper about the *p*-dispersion problem is one of the applications of the spatially informed solution approach. There are various kinds of spatial optimization problems, and most of the problems are recognized as computationally intensive problems. Beyond the *p*-dispersion problem, I plan to investigate other types of location problems, and currently, examining the optimal location (and allocation) behaviors of the hub location problems to investigate a relationship between location behaviors and spatial properties of the problem. The hub location problem is especially regarded as a complicated location problem due to its tricky location behavior, unlike other types of location problems. The innate spatial properties and their relationship to the location behaviors will hint at building an efficient solution model to the hub location problem.

I have been a member of the SAM specialty group since I started my Ph.D. program. The SAM community has provided many valuable seminars and workshops and I have been able to benefit from those opportunities. I would like to thank the SAM community for giving me this opportunity to introduce myself and my research.

SAM-Sponsored Sessions at 2024 AAG Meeting

The SAM SG is sponsoring the sessions below. Click the link for your access to the detailed information of sessions.

- ***Spatial Analysis and Modeling Specialty Group Business Meeting***
- ***John Odland SAM student paper competition I***
- ***John Odland SAM student paper competition II***
- ***Spatial Analysis and Modeling (SAM) / Geographical Analysis Plenary: Peter Rogerson, Arizona State University***
- Advancing health research: Harnessing geospatial big data and geoanalytical techniques
- Beyond Averages 1: Methods, Applications and Analysis of Extreme Event Climate Data
- Beyond Averages 2: Methods, Applications and Analysis of High Resolution Climate Data
- Beyond Averages 3: Methods, Applications and Analysis of Drought Climate Data
- Environmental Data Deserts 1: Understanding the Causes and Consequences of the Unequal Coverage of Environmental Monitoring Networks
- Environmental Data Deserts 2: Understanding the Causes and Consequences of the Unequal Coverage of Environmental Monitoring Networks
- Error and Change Analysis in GIS and Remote Sensing
- Exploring Geospatial Methods and Human Dynamics to Address Challenges of the Sustainable Development Goals (SDGs) 1: Health Disparity
- Exploring Geospatial Methods and Human Dynamics to Address Challenges of the Sustainable Development Goals (SDGs) 2: Sustainable Development
- Exploring Geospatial Methods and Human Dynamics to Address Challenges of the Sustainable Development Goals (SDGs) 3: Methods to Support the SDGs
- GeoAI and Deep Learning Symposium - Responsible GeoAI I: Privacy and Fairness
- GeoAI and Deep Learning Symposium - Responsible GeoAI II: Justice and Accuracy

- GeoAI and Deep Learning Symposium: GeoAI and Social Sensing for Human-Pandemic Dynamics Ⅰ
- GeoAI and Deep Learning Symposium: GeoAI and Social Sensing for Human-Pandemic Dynamics Ⅱ
- GeoAI and Deep Learning Symposium: GeoAI for Science and the Science of GeoAI
- GeoAI and Deep Learning Symposium: GeoAI for Spatial Analytics and Modeling
- GeoAI and Deep Learning Symposium: GeoAI for Sustainable and Computational Agriculture I
- GeoAI and Deep Learning Symposium: GeoAI for Sustainable and Computational Agriculture II
- GeoAI and Deep Learning Symposium: GeoAI Foundation Models
- GeoAI and Deep Learning Symposium: GeoHealth Data Science
- GeoAI and Deep Learning Symposium: Spatially Explicit Machine Learning and Artificial Intelligence I
- GeoAI and Deep Learning Symposium: Spatially Explicit Machine Learning and Artificial Intelligence II
- GeoAI and Deep Learning Symposium: Spatially Explicit Machine Learning and Artificial Intelligence III
- Geography and Data Science for Public Good II: Data-Driven Evidence and Solutions to Social and Spatial Inequalities.
- Geography and Data Science for Public Good III: Data-Driven Evidence and Solutions to Social and Spatial Inequalities.
- Geospatial Approaches to Mobility and Health Issues: Under-examined Cities (Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security)
- Land change and development pathways
- Lifecourse and Exposome-Based Research in Geospatial Health Applications I
- Lifecourse and Exposome-Based Research in Geospatial Health Applications II
- Mapping and Analyzing Land Use and Land Cover Changes in Brazil
- Monitoring and Characterization of Land Change Using Satellite Time Series
- Panel: Spatial Data Science in an Age of Scientific Disruption - A Curriculum
- Place & the Social-Spatial Determinants of Health Symposium 1
- Place & the Social-Spatial Determinants of Health Symposium 2
- Place & the Social-Spatial Determinants of Health Symposium 3
- Place & the Social-Spatial Determinants of Health Symposium 4 Panel
- Revolutionizing Urban Health I: AI Advancements for Healthy Cities
- Revolutionizing Urban Health II: AI Advancements for Healthy Cities
- Spatial and spatiotemporal analysis in helping end the HIV epidemic in the U.S.
- Spatial Data Science in an Age of Scientific Disruption - A Research Agenda
- Spatial Optimization and Analysis 1
- Spatial Optimization and Analysis 2
- Symposium on Geospatial Data Science for Sustainability: A repeatable, reproducible, and expandable (RRE) framework integrating GeoAI and spatiotemporal simulation - Series I

- Symposium on Geospatial Data Science for Sustainability: A repeatable, reproducible, and expandable (RRE) framework integrating GeoAI and spatiotemporal simulation - Series II
- Symposium on Geospatial Data Science for Sustainability: Advances in approaches and methods of flood resilience studies 1
- Symposium on Geospatial Data Science for Sustainability: Advances in approaches and methods of flood resilience studies 2
- Symposium on Geospatial Data Science for Sustainability: Advances in multitemporal remote sensing for terrestrial ecosystems 1
- Symposium on Geospatial Data Science for Sustainability: Advances in multitemporal remote sensing for terrestrial ecosystems 2
- Symposium on Geospatial Data Science for Sustainability: Challenges and Opportunities of Spatial Accessibility 1
- Symposium on Geospatial Data Science for Sustainability: Challenges and Opportunities of Spatial Accessibility 2
- Symposium on Geospatial Data Science for Sustainability: Convergence Curriculum for Geospatial Data Science
- Symposium on Geospatial Data Science for Sustainability: CyberGIS and Spatial Decision Support System
- Symposium on Geospatial Data Science for Sustainability: Data-intensive Geospatial Understanding for Sustainability Solutions
- Symposium on Geospatial Data Science for Sustainability: Development and Application of Spatial Models for Human-Environmental Systems to Address Social and or Environmental Challenges
- Symposium on Geospatial Data Science for Sustainability: Embedding Ethics in Geospatial Data Science and AI
- Symposium on Geospatial Data Science for Sustainability: Ethics in Geospatial AI and Data Science
- Symposium on Geospatial Data Science for Sustainability: Geospatial Platform for Sustainability Research and Education
- Symposium on Geospatial Data Science for Sustainability: Harnessing Mobility Data for Spatial Knowledge Discovery
- Symposium on Geospatial Data Science for Sustainability: Multiscale Mapping That Works: Harnessing Intelligent Methods for Cartographic Display and Analysis
- Symposium on Geospatial Data Science for Sustainability: Navigating Cities - Exploring Human Mobility through Innovative Geospatial Science Approaches
- Symposium on Geospatial Data Science for Sustainability: The Geospatial Component in the Decarbonization of Net-zero Emissions Energy Systems
- Symposium on Community Resilience Research: Do the Numbers Represent as They Are Defined?
- Symposium on Community Resilience Research: Geospatial Data Science to Enhance Community Resilience to Urban Environmental Hazards
- Symposium on GeoAI and Deep Learning for Geospatial Research: Human-centered Geospatial Data Science
- Symposium on GeoAI and Deep Learning for Geospatial Research: Human-centered Geospatial Data Science II
- Symposium on GeoAI and Deep Learning for Geospatial Research: Human-centered Geospatial Data Science III
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Acceptance and Hesitancy in Vaccine Uptake from Geospatial Perspectives

- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Advances in Remote Sensing and Artificial Intelligence for Sustainable Development Goals
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security – Applying geospatial information in occupational and environmental health research
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Closing Plenary
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Exploring the Transformative Power of Nature's Embrace on Health and Well-Being
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security – GIS, Road and Accessibility
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - International Geospatial Health Research Network (IGHRN)
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Mobile Sensing and Spatiotemporal Analysis of Human Mobility and Environmental Health
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Opening Keynote
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Spatiotemporal Big Data Mining and Knowledge Service in Public Health
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Vector-borne Diseases under Environmental Changes (1)
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Vector-borne Diseases under Environmental Changes (2)
- Symposium on Geospatial Approaches to Pressing Grand Challenges: Global Pandemics, Climate Change, and Food Security - Vector-borne Diseases under Environmental Changes (3)
- Symposium on Human Dynamics Research: Geospatial Digital Twins (GDT) for Sustainable Planning and Management
- Symposium on Human Dynamics Research: Human Dynamics meets GeoAI
- Symposium on Human Dynamics Research: Mining Human Dynamics with Big Data & Spatio-Temporal Analysis I
- Symposium on Human Dynamics Research: Mining Human Dynamics with Big Data & Spatio-Temporal Analysis II
- Symposium on Human Dynamics Research: the Future of Computational Urban Science
- Symposium on Human Dynamics Research: the Next 10 Years
- Symposium on Human Dynamics Research: the Past 10 Years
- The Waldo Tobler Distinguished Lecture in GIScience
- Towards Energy Resilience
- Understanding Climate Change Effects on Environmental Health through GIScience: Water Insecurity, Air Pollution, and Health Disparities

News From SAM Community

Dr. Yingjie Hu was recently featured in the NPR Academic Minutes program for his research on geo-knowledge-guided GPT model for disaster response (see details published in *International Journal of Geographical Information Science*). He was featured in the story on Feb. 22, 2024 at NPR The Academic Minute. You can also find the story on the website of the American Association of Colleges and Universities (AAC&U).

About Spatial Analysis and Modeling (SAM) Specialty Group

Our mission is to foster and maintain interaction, cooperation and community among individuals interested in the analysis of geo-referenced data, modeling of spatio-temporal processes and the use of analytical and computational techniques in solving geographic problems. The specialty group promotes the scientific study of physical, environmental and socioeconomic geography and the development, use and teaching of analytical cartography, GIS, remote sensing, spatial statistical, mathematical and computational techniques for spatial analysis. For more information, see the SAM-SG homepage (http://sam-aag.org/).

Membership Dues
Regular: $6
Student: $1

Submissions
This newsletter reaches many readers and is therefore an excellent venue for getting the word out on community news, departmental happenings, research findings, media appearances, and the like. It is also a good place to post calls for proposals, awards, grants, fellowships, and jobs. We also invite you to submit commentaries or features of broad interest to specialty group members.

The newsletter relies on volunteers to submit articles, so please take a moment to send along relevant items when they are solicited.

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