## **Guofeng Cao**

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# **Curriculum Vitae**

Last update: September 2024

# I. GENERAL INFORMATION

# **Research and Teaching Interests**

- GIScience and Remote Sensing
- Geostatistics and Spatiotemporal Statistics
- Uncertainty-Aware Spatiotemporal Modeling
- GeoAI and Big Data
- Geospatial Cyberinfrastructure

# Education

- 2011 Ph.D.: Department of Geography, University of California, Santa Barbara
  - Specialization: GIScience and Environmental Statistics
  - Dissertation Co-Advisors: Phaedon C. Kyriakidis and Michael F. Goodchild
- 2009 M.A.: Department of Statistics, University of California, Santa Barbara
  - Specialization: Applied Statistics
- 2004 M.S.: Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, Beijing, China
  - Specialization: Cartography and GIS
- 2001 B.S.: Department of Earth Sciences, Zhejiang University, Hangzhou, China
  - Specialization: Remote sensing
  - Minor in Computer Science

## **Current Academic Position(s)**

09/2020- Assistant Professor, Dept. of Geography, University of Colorado Boulder
03/2021- Faculty Affiliate, Natural Hazard Center, University of Colorado Boulder
09/2021- Faculty Affiliate, CU Population Center, University of Colorado Boulder
09/2020- Faculty Affiliate, Dept. of Geosciences, Texas Tech

## Prior Academic Position(s)

09/2019-09/2020	Associate Professor (with tenure), Dept. of Geosciences, Texas Tech
10/2015-09/2020	Co-Director, Center for Geospatial Technology, Texas Tech
09/2013-09/2020	Faculty Affiliate, National Wind Institute, Texas Tech
09/2013-09/2020	Faculty Affiliate, Climate Science Center, Texas Tech
09/2013-09/2019	Assistant Professor, Dept. of Geosciences, Texas Tech
08/2011-08/2013	Postdoctoral Research Associate, University of Illinois Urbana-Champaign
09/2006-08/2011	Graduate Assistant, Department of Geography and Center for Spatial Studies, University of California, Santa Barbara
06/2008-09/2008	Graduate Assistant, High Energy Physics (T-8) Group, Los Alamos National Laboratory

## **Prior Industrial Position(s)**

06/2010-09/2010	Graduate Research Assistant, TeleNav Inc., Sunnyvale, CA
	<ul> <li>Map matching/conflation and traffic modeling</li> </ul>
06/2007-09/2007	Graduate Research Assistant, ESRI Inc., Redlands, CA
	<ul> <li>Geostatistics group of ESRI</li> </ul>
06/2001-09/2006	Development lead, SuperMap Software Co., Ltd, Beijing, China
	<ul> <li>Led the research and development of a national award winning (of China) 3D GIS and spatial analysis software at SuperMap (a leading GIS platform in China)</li> </ul>

## Honors, Distinctions & Awards

- 2005 National Scientific Technology Progress Award of China (second-class) as a member of SuperMap
- 1998-2000 Scholarship for excellent students, Zhejiang University, Hangzhou, China

# II. RESEARCH

## **II.A Grants & Contracts**

(\* indicates the leading principal investigator of the proposal)

#### **External Applications Funded:**

- 8. National Aeronautics and Space Administration (NASA): Understanding the Effects of Agricultural Land Use Transformations on Weather Dynamics in Southern High Plains. Amount: ~\$740k (~\$410k to Cao, G.). Role: <u>PI</u>
- 7. US Dept. of Agriculture (USDA): Modeling Spatiotemporal Distribution of Mormon Crickets with Geospatial Artificial Intelligence (2024-2025). Amount: **\$134k**. Role: <u>PI</u>
- National Science Foundation (NSF, DMS-2220529): Collaborative Research: A Geostatistical Framework for Spatiotemporal Extremes (2023-2026). Amount \$150k. Role: <u>PI</u>
- US Dept. of Agriculture (USDA): Geospatial Artificial Intelligence (GeoAI) for Spatiotemporal Modeling of Pest Insects (2022-2023, NCE till 2025). Amount: \$100k with \$20k cost share. Role: <u>Sole PI</u>
- 4. National Science Foundation (NSF, BCS-2026331): Deep Learning in Geospatial Uncertainty Modeling (2021-2024). Amount: **\$265,058**. Role: <u>Sole PI</u>
- US Dept. of Commerce National Institute of Standard and Technology (DOC NIST): Innovative Measurement and Modeling of Dynamical Social and Health Effects of Windstorms (2020-2023, NCE till 2024). Amount: \$667,024 (\$234,140 to Cao, G.). Role: <u>Co-PI</u>
- US Geological Survey (USGS): Toward Near Real-time Monitoring and Characterization of Land Surface Change for the Conterminous US (2017-2022, NCE till 2023). Amount: \$1,062,069 (~\$200k to Cao, G). Role: <u>Co-PI</u><sup>1</sup>
- 1. US Environmental Protection Agency (EPA): Texas Indoor Radon Map 2020 (2020-2021). Amount: **\$77, 182** (**\$20k** to Cao, G). Role: <u>Co-PI</u>. <sup>1</sup>

#### Prior to CU:

- 6. CH Foundation: Mapping Local Community Preparedness to Tornado Hazards in Lubbock, Texas (2018-2019). Amount: **\$29,500**. Role: **<u>PI</u>** (with D. Liang)
- 5. CH Foundation: Immersive VR Experience for Teaching, Learning, and Researching (2018-2019). Amount: **\$17,989**. Role: <u>Co-PI</u> (with Litsey R.\*, TTU)

<sup>&</sup>lt;sup>1</sup>This project was awarded to and conducted at Texas Tech

- US Agency for International Development (USAID): Mappers Without Borders (2015-2019). Amount: **\$999,000**. Role: <u>Co-PI</u> (with P. Solis\*, K. Mulligan and C. Portillo-Quintero)
- 3. US Dept. of Agriculture (USDA): Development of Current Hydrologic Data and Analysis of Water Availability in the Ogallala Aquifer over the Next 50 Years (2014-2016). Amount: **\$119, 895**. Role: <u>Co-PI</u> (with K. Mulligan\* and L. Barbato)
- US Dept. of Agriculture (USDA): Development of a GIS Model to Project and Map Future Water Availability (2015-2016). Amount: \$40,679. Role: <u>Co-PI</u> (with K. Mulligan\* and L. Barbato)
- National Institute on Minority Health and Health Disparities Pilot Research Core: Center of Excellence at Meharry (NIMHD HDRCOE): The role of climate and air pollution for racial disparities in infant mortality (2014-2015). Amount: \$12,729. Role: <u>Co-PI</u> (with L. Gittner\* and J. Vanos)

#### **Internal Applications Funded:**

- 2. CU Population Center (CUPC): Understanding Community Disaster Resilience with GeoAI and Big Geospatial Data (2023-2024). Amount: **\$25k**. Role: **Sole PI**
- 1. CU Population Center (CUPC): Understanding Social Dynamics with Location-Based Social Media (2022-2023). Amount: **\$15k**. Role: <u>Sole PI</u>

#### Prior to CU:

- 3. Texas Tech: Story Maps of Humanitarian Projects around the World (2017-2018). Amount: **\$90,000**. Role: <u>Co-PI</u>
- Texas Tech National Wind Institute: Toward a Geospatial Cyberinfrastructure for Enhancement of Community Resilience to Tornado Hazards (2014-2015). Amount: \$30, 500. Role: <u>Sole PI</u>
- 1. Texas Tech Transdisciplinary Research Academy: A Big Data Approach for Spatial Environmental Epidemiology (2014-2015). Amount: **\$4,000**. Role: **PI**

#### **Travel and Other Grants:**

- 3. Texas Tech Open Access Publication Initiative: 2018
- 2. National Science Foundation (NSF) Travel Grants: Geocomputation 2015, CyberGIS 2012 and 2015, ACM GIS 2011
- 1. Jack Dangermond Travel Grants, UCSB 2007, 2010, 2011

## **II.B** Publications

(\* *indicates corresponding author,* † *advisee or mentee author(s) for whom I served as the principal supervisor)* 

#### **Peer-Reviewed Book Chapters**

- Zhu, D.\*, Cao, G. (2023): Intelligent spatial prediction and interpolation methods. In Gao, S., Hu, Y. and Li, W. (eds) *Handbook of Geospatial Artificial Intelligence*. CRC Press. https://doi.org/10.1201/9781003308423-7
- 6. **Cao, G.**\* and Buttenfield, B. P. (2022). Pattern recognition and matching. In John P. Wilson (ed.) *The Geographic Information Science & Technology Body of Knowledge* (2nd Quarter 2022 Edition). https://doi.org/10.22224/gistbok/2022.2.10
- Cao, G.\* (2022): Deep Learning of Big Spatiotemporal Data: Challenges and Opportunities. In: Li, B., Shi, X., Zhu, AX., Wang, C., Lin, H. (eds) *New Thinking in GIScience*. Springer, Singapore. https://doi.org/10.1007/978-981-19-3816-0\_18
- 4. **Cao**, **G**.\* and Zhao, N. (2021): Integrating remote sensing and social sensing to examine socioeconomic dynamics. In Yang, X. (ed.)*Urban Remote Sensing: Monitoring, Synthesis and Modelling in the Urban Environment 2e*. Wiley Blackwell. https://doi.org/10.1002/9781119625865.ch7
- Liu, Y.<sup>+</sup>, Cao, G.\* and Zhao, N.<sup>+</sup> (2020): Spatiotemporal mapping of ground-level *PM*<sub>2.5</sub> concentrations using a machine learning based-geostatistical approach. In Li, L., Zhou, X. and Tong, W. (eds) *Spatiotemporal Analysis of Air Pollution and Its Application in Public Health*. Elsevier. https://doi.org/10.1016/B978-0-12-815822-7.00006-6
- 2. **Cao, G.**\* (2016): Modeling uncertainty in categorical fields, *International Encyclopedia of Geography: People, the Earth, Environment and Technology,* 1-11. https://doi.org/10.1002/9781118786352.wbieg0604
- Wang, S.\* and Cao, G., Zhang, Z., Zhao, Y., Padmanabhan, A. and Wu, K. (2013): A CyberGIS environment for analysis of location-based social media data. In Hassan, A.K. and Amin, H. (eds) *Advanced Location-Based Computing and Services,2nd Edition*. CRC Press. https://doi.org/10.1201/b14940

#### **Peer-Reviewed Journals Articles**

- 49. Li, G.<sup>+</sup> and **Cao**, **G**.<sup>\*</sup>: Generative adversarial models for extreme super-resolution of climate datasets. *International Journal of Applied Earth Observation and Geoinformation*. https://doi.org/10.48550/arXiv.2402.14049
- 48. Huang, L.\*, Willis, M.J., Li, G.<sup>+</sup>, Lantz, T.C., Schaefer, K., Wig, E., **Cao, G.** and Tiampo, K. (2023): Identifying active retrogressive thaw slumps in the pan-Arctic

from ArcticDEM. *ISPRS Journal of Photogrammetry and Remote Sensing*, 205, 301-316. https://doi.org/10.1016/j.isprsjprs.2023.10.008

- Xiao, W., Su, J.\* and Cao, G\* (2023): Cross-scale guided fusion transformer for disaster assessment using satellite imagery. *IEEE Transaction on Geosciences and Remote Sensing*, 61, 1-12. https://doi.org/10.1109/TGRS.2023.3298037.
- 46. Ye, S.\*, Zhu, Z., and **Cao, G.** (2023). Object-based continuous monitoring of land disturbances from dense Landsat time series. *Remote Sensing of Environment*, 287, 113462. https://doi.org/10.1016/j.rse.2023.113462
- 45. Neupane, J., Guo, W.\*, **Cao, G.**, Zhang, F., Slaughter, L., and Deb, S. (2022). Spatial patterns of soil microbial communities and implications for precision soil management at the field scale. *Precision Agriculture*, 23(3), 1008-1026. https://doi.org/10.1007/s11119-021-09872-1
- 44. Liang, D.\*, Cong, Z., and **Cao, G.** (2022). Examination of diffusion patterns of tornado warning using an agent-based model and simulation. *Weather, Climate, and Society*, 14(2), 521-533. https://doi.org/10.1175/WCAS-D-21-0089.1
- 43. Coman, E. N.\*, Steinbach, S., and **Cao, G.** (2022). Spatial perspectives in family health research. Family Practice, 39(3), 556-562. https://doi.org/10.1093/fampra/cmab165
- 42. Rabia, A. H., Neupane, J., Lin, Z., Lewis, K., **Cao, G.**, and Guo, W.\* (2022). Principles and applications of topography in precision agriculture. *Advances in Agronomy*, 171, 143-189. https://doi.org/10.1016/bs.agron.2021.08.005
- 41. Sun, Y., Guo, W.\*, Weindorf, D., Sun, F., Deb, S., Cao, G., Neupane, J., Lin, Z., and Raihan, A. (2021). Field-scale spatial variability of soil calcium in a semi-arid region: Implications for soil erosion and site-specific management, *Pedosphere*, 31 (5), 2021. https://doi.org/10.1016/S1002-0160(21)60019-X
- 40. Jamali, M., Nejat, A.\*, Moradi, S., Ghosh, S., **Cao, G.**, Jin, F. (2020). Social media data and housing recovery following extreme natural hazards. *International Journal of Disaster Risk Reduction*, 51, 101788. https://doi.org/10.1016/j.ijdrr.2020.101788
- 39. Zhao, N.<sup>+</sup>, Liu, Y.<sup>+</sup>, Hsu, F., Samson, E.L., Husi, L., Liang, D, **Cao, G.**<sup>\*</sup> (2020). Time series analysis of VIIRS-DNB nighttime lights imagery for change detection in urban areas: A case study of devastation in Puerto Rico from hurricanes Irma and Maria. *Applied Geography*, 120, 102222. https://doi.org/10.1016/j.apgeog.2020.102222
- 38. Zhao, N.<sup>+</sup>, Cao, G.\*, Zhang, W., Samson, E. L., and Chen, Y. (2020). Remote sensing and social sensing for socioeconomic systems: A comparison study between nighttime lights and location-based social media at the 500 m spatial resolution. *International Journal of Applied Earth Observation and Geoinformation*, 87, 102058. https://doi.org/10.1016/j.jag.2020.102058

- Tiffin, H. S., Peper, S. T., Wilson-Fallon, A. N., Haydett, K. M., Cao, G., and Presley, S. M.\* (2019). The influence of new surveillance data on predictive species distribution modeling of *Aedes aegypti* and *Aedes albopictus* in the United States. *Insects*, 10(11), 400. https://doi.org/10.3390/insects10110400
- 36. Nguyen, L., Yang, Z., Li, J., **Cao, G.** and Jin, F.\* (2019): Forecasting people's needs in hurricane events from social network. *IEEE Transactions on Big Data*, 8(1): 229-240. https://doi.org/10.1109/TBDATA.2019.2941887
- 35. Guo, M.\*, Su, J. and **Cao, G.** (2019): Statistical regression analysis of functional and shape data. *Journal of Applied Statistics*. 47(1): 28-44. https://doi.org/10.1080/02664763.2019.1669541.
- Liu, S., Su, H., Cao, G., Wang, S. and Guan, Q.\* (2019): An iterative spatio-temporal consistency modification method for urban land cover trajectory analysis. *ISPRS Journal of Photogrammetry and Remote Sensing*, 154, 202-215. https://doi.org/10.1016/j.isprsjprs.2019.06.006
- 33. Han, S. Y.\*, Tsou, M. H., Knaap, E., Rey, S., and **Cao, G.** (2019). How do cities flow in an emergency? Tracing human mobility patterns during a natural disaster with big data and geospatial data science. *Urban Science*, 3(2), 51. https://doi.org/10.3390/urbansci3020051
- Liu, Y.<sup>+</sup>, Zhao, N.<sup>+</sup>, J. Vanos and Cao, G.\* (2019): Revisiting estimations of *PM*<sub>2.5</sub>-attributable mortality with advancements in *PM*<sub>2.5</sub> mapping and statistical mortality rates: A case study on ischemic heart diseases. *Science of the Total Environment*, 66, 499-507. https://doi.org/10.1016/j.scitotenv.2019.02.269
- Zhao, N.<sup>+</sup>, Zhang, W., Liu, Y.<sup>+</sup>, Samson, E., Chen, Y. and Cao, G.\* (2019): Improving nighttime lights imagery with location-based social media data. IEEE Transactions on Geosciences and Remote Sensing, 57(4): 2161-2172. https://doi.org/doi:10.1109/TGRS.2018.2871788
- 30. Jamali, M.\*, Nejat, A., Ghosh, S., Jin, F. and **Cao, G.** (2019): Social media data and post-disaster recovery of giant natural disasters. *International Journal of Information Management*, 44, 25-37. https://doi.org/10.1016/j.ijinfomgt.2018.09.005
- 29. Zhao, N.<sup>+,\*</sup>, Liu, Y.<sup>+</sup>, J. Vanos, and **Cao, G.** (2018): Day-of-week and seasonal patterns of *PM*<sub>2.5</sub> concentrations over the United States: Time-series analyses using the Prophet procedure. *Atmospheric Environment*, 192, 116-127. https://doi.org/10.1016/j.atmosenv.2018.08.050
- 28. Herdt, A., Brown, R., Scott-Fleming, S., Cao, G., MacDonald, M., Henderson, D. and Vanos, J.\* (2018): Outdoor thermal comfort during anomalous heat at the 2015 Pan American soccer games in Toronto, Canada. Atmosphere, 9(8), 321. https://doi.org/10.3390/atmos9080321

- 27. Zhao, N.<sup>+,\*</sup>, **Cao, G.**, W. Zhang and E. L. Samson (2018): Tweets or nighttime lights: comparison for preeminence in estimating socioeconomic factors. *ISPRS Journal of Photogrammetry and Remote Sensing*, 146, 1-10. https://doi.org/10.1016/j.isprsjprs.2018.08.018
- Liu, Y.<sup>+</sup>, Cao, G.<sup>\*</sup>, Zhao, N.<sup>+</sup>, Mulligan, K., Ye, X. (2018): Improve ground-level *PM*<sub>2.5</sub> concentration mapping using a random forests-based geostatistical approach. *Environmental Pollution*, 235, 272-282. https://doi.org/10.1016/j.envpol.2017.12.070

# <u>Note:</u> A PM<sub>2.5</sub> concentration dataset derived in this paper (1km resolution for the United States 2000-2015) is available.

- 25. Gao, Y., Wang, S.\*, Padmanabhan, A., Yin, J. and **Cao, G.** (2018): Mapping spatiotemporal patterns of events using social media: A case study of influenza trends. *International Journal of Geographic Information Science*, 32 (3), 425-449. https://doi.org/10.1080/13658816.2017.1406943
- Liu, Y.<sup>+</sup>,\*, Zhao, N.<sup>+</sup>, Vanos, J. and Cao, G. (2017): Visualizing changes in nationally averaged *PM*<sub>2.5</sub> concentrations by an alluvial diagram. *Environment and Planning A: Economy and Space (Featured graphics)*, 50 (2), 259-261. https://doi.org/10.1177/0308518X17745067
- 23. Hardin, A., Liu, Y.<sup>+</sup>, **Cao, G.** and Vanos, J.\* (2017): Urban heat island intensity and spatial variability by synoptic weather type in the northeast US. *Urban Climate*, 24, 747-762. https://doi.org/10.1016/j.uclim.2017.09.001
- 22. Zhao, N.<sup>+</sup> and **Cao, G.**\* (2017): Quantifying and visualizing language diversity of Hong Kong using Twitter. *Environment and Planning A: Economy and Space (Featured graphics)*, 49 (12), 2698-2701. https://doi.org/10.1177/0308518X17722369
- Mehdipoor, H., Vanos, J.\*, Zurita-Milla, R. and Cao, G. (2017): Short communication: Emerging technologies for biometeorology. *International Journal of Biometeorology*, 61 (1), 81-88. https://doi.org/10.1007/s00484-017-1399-9
- 20. Fisher-Phelps, M.\*, **Cao**, G., Wilson, R. and Kingston, T. (2017): Protecting bias: Across time and ecology, open-source bat locality data are heavily biased by distance to protected area. *Ecological Informatics*, 40, 22-34. https://doi.org/10.1016/j.ecoinf.2017.05.003
- Zhao, N.<sup>+,\*</sup>, Hsu, F., Cao, G and Samson, E. (2017): Improving accuracy of economic estimations with VIIRS DNB image products. *International Journal of Remote Sensing*, 38 (21), 5899-5918. https://doi.org/10.1080/01431161.2017.1331060
- Zhao, N.<sup>+,\*</sup>, Liu, Y.<sup>+</sup>, Cao, G., Samson, E., Zhang, J. (2017): Forecasting China's GDP at the pixel level using nighttime light time series images. *GIScience & Remote Sensing*, 54(3), 407-425. https://doi.org/10.1080/15481603.2016.1276705

 Zhao, N.<sup>+</sup>, Cao, G.\*, Vanos, J., Vecellio, D. (2017): Effects of synoptic weather on influenza infection incidence: A retrospective study using influenza surveillance data and spatial synoptic classification. *International Journal of Biometeorology*, 62 (1), 69-84. https://doi.org/10.1007/s00484-017-1306-4

Note: An influenza dataset for major cities of the United States derived in this paper (a combination of Google Flu Trends and CDC reports) is available.

- Liu, Y.<sup>†,\*</sup>, Zhao, N.<sup>†</sup>, Vanos, J., and Cao, G (2017): Effects of synoptic weather on ground-level PM2.5 concentrations in the United States. *Atmospheric Environment* (148) 297-305. https://doi.org/10.1016/j.atmosenv.2016.10.052
- 15. Liu, Y.<sup>+</sup>,\*, Delahunty, T., Zhao, N<sup>+</sup>. and **Cao, G.** (2016): These lit areas are undeveloped: China's urban extents and urban development patterns from thresholded nighttime light imagery. *International Journal of Applied Earth Observation and Geoinformation*, 50(8), 39-50. https://doi.org/10.1016/j.jag.2016.02.011
- 14. Luo, F.<sup>+</sup>, **Cao**, **G.**<sup>\*</sup>, Mulligan, K. and Li, X. (2016): Explore spatiotemporal and demographic characteristics of human mobility via Twitter: A case study of Chicago. *Applied Geography*, 70 (5), 11-25. https://doi.org/10.1016/j.apgeog.2016.03.001

**Note:** This article is the most cited article in *Applied Geography* since 2016. Accessed: 06/31/2019

 Cao, G.\*, Wang, S., Hwang, M., Padmanabhan, A., Zhang, Z. and Soltani, K. (2015): A general framework for scalable spatio-temporal analysis of location-based social media data, *Computers, Environment and Urban System*, 51(5), 70-82. https://doi.org/10.1016/j.compenvurbsys.2015.01.002

**Note:** This article is one of the top 25 most cited articles in *Computers, Environment and Urban System* since 2015. Accessed: 08/31/2018

- Padmanabhan, A.\*, Wang, S., Cao, G., Hwang, H., Zhao, Y., Zhang Z. and Gao Y. (2014): FluMapper: an interactive CyberGIS environment for massive location-based social media data analysis, *Concurrency and Computation: Practice and Experience*, 26(13) 2253-2265. https://doi.org/10.1145/2484762.2484821
- Cao, G.\*, Yoo, E.H., Wang, S. (2014): A statistical framework of data fusion for spatial prediction of categorical variables. *Stochastic Environmental Research and Risk Assessment*, 28 1785-1799. https://doi.org/10.1007/s00477-013-0842-7

#### Note: A Matlab toolbox associated with this paper is available.

- 10. Leetaru, K.\*, Wang, S., **Cao, G.**, Padmananabhan, A., Shook, E. (2013): Mapping the global Twitter heartbeat: the geography of Twitter. *First Monday*. https://doi.org/10.5210/fm.v18i5.4366
- 9. Yoo, E.H.\*, Hoagland, B.W., **Cao**, **G.** and Fagin, T.D. (2013): Spatial distribution of trees and landscapes of the past: a mixed spatially correlated multinomial logit model approach for the analysis of the Public Land Survey data. *Geographical Analysis*, 45(4), pp.419-440. https://doi.org/10.1111/gean.12018

- 8. Luo, F.\*, Zhong, E., **Cao**, G., Tellez, R.D. and Gao, P. (2013): VGIS-AntiJitter: an effective framework of solving jitter problems in virtual geographic information systems. *International Journal of Digital Earth*, 6(1), pp.28-50. https://doi.org/10.1080/17538947.2011.601766
- Cao, G.\*, Kyriakidis, P.C., and Goodchild, M.F. (2012): Response to 'Comments on 'Combining spatial transition probabilities for stochastic simulation of categorical fields' with communications on some issues related to Markov chain geostatistics'. *International Journal of Geographical Information Science*, 26(10), pp.1741-1750. https://doi.org/10.1080/13658816.2012.717630

#### **Note:** A Matlab toolbox associated with this paper is available.

 Cao, G.\*, Kyriakidis, P.C. and Goodchild, M.F. (2011): A multinomial logistic mixed model for prediction of categorical spatial data. *International Journal of Geographical Information Science*, 25(12), pp.2071-2086. https://doi.org/10.1080/13658816.2011.600253

#### Note: A Matlab toolbox associated with this paper is available.

 Cao, G.\*, Kyriakidis, P.C. and Goodchild, M.F. (2011): Combining spatial transition probabilities for stochastic simulation of categorical fields. *International Journal of Geographical Information Science*, 25(11), pp.1773-1791. https://doi.org/10.1080/13658816.2010.528421

#### Note: A Matlab toolbox associated with this paper is available.

- 4. Li, K.\*, Zhong, E., Zeng, Z. and **Cao, G.**(2006): An optimal path algorithm based on hierarchically structured topographical network. *Journal of Images and Graphics (In Chinese)*, 11(07): 1004-1009. http://dx.doi.org/10.11834/jig.200607172
- 3. Zhang, X.\*, Zhang, L., **Cao**, **G**. and Zhong, E.(2006): A study on expressing techniques of battlefield situation evolution and variation based on GIS and its application. *Geo-Information Science (In Chinese)*, 8(4). http://www.dqxxkx.cn/EN/Y2006/V8/I4/80
- 2. Zhang, L.\*, Zhu, J., Zeng, Z., and **Cao**, **G**.(2006): GRID services for large scale elevation derivatives computation. *Geo-Information Science (In Chinese)*, 8(2), pp.14-29. http://www.dqxxkx.cn/CN/Y2006/V8/I2/14
- Cao, G.\*, Zhang, L. and Zhong, E. (2005): A discussion on key techniques in 3D GIS rendering engine. *Geo-Information Science (In Chinese)*, 7(1), pp.87-91. http://www.dqxxkx.cn/EN/Y2005/V7/I1/87

#### **Conference Proceedings with Full Paper Review**

20. Li, G.<sup>+</sup> and **Cao**, G.<sup>\*</sup>: Neural process for uncertainty-aware geospatial modeling. *Proceedings of the 7th ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery* (accepted).

- 19. Li, G.<sup>+</sup> and **Cao**, G.<sup>\*</sup>: Statistical downscaling of climate datasets with deep generative model and Bayesian inference. *Proceedings of I-GUIDE Forum 2024: Convergence Science and Geospatial AI for Environmental Sustainability* (accepted).
- 18. Li, G.<sup>†,\*</sup> and **Cao, G.**: Bayesian super-resolution using deep generative models. *GeoKG& GeoAI* 2023. https://doi.org/10.17605/OSF.IO/H2AWQ
- 17. Zhu, D.\*, Gao, S., and **Cao, G.** (2022). Towards the intelligent era of spatial analysis and modeling. In *Proceedings of the 5th ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery*, pp. 10-13. https://doi.org/10.1145/3557918.3565863
- Du, H., Long, N., Yang, Z., Abu-Gellban, H., Zhou, X., Xing, W., Cao, G. and Jin, F.\* (2019): Twitter vs News: Concern analysis of the 2018 California wildfire event. In 2019 IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC), pp. 207-212. https://doi.org/10.1109/COMPSAC.2019.10208
- Yang, Z., Nguyen, L. H., Stuve, J., Cao, G., and Jin, F.\* (2017): Harvey flooding rescue in social media. In 2017 IEEE International Conference on Big Data (Big Data), pp. 2177-2185. https://doi.org/10.1109/BigData.2017.8258166
- 14. Liu, Y.<sup>+</sup>,\*, Luo, F.<sup>+</sup> and **Cao, G.** (2015): Track spatiotemporal spread of public concerns on Ebloa in the US via Twitter. In *Proceedings of Geocomputation* 2015 *Conference*. http://www.geocomputation.org/2015/papers/GC15\_67.pdf
- Luo, F.<sup>+,\*</sup>, Cao, G., and Li, X. (2014): An interactive approach for deriving geometric network models in 3D indoor environments. In *Proceedings of the Sixth ACM SIGSPATIAL International Workshop on Indoor Spatial Awareness*, pp. 9-16. https://doi.org/10.1145/2676528.2676531
- 12. Huang, Q.\*, **Cao**, G., and Wang, C. (2014): From where do Tweets originate?-A GIS approach for user location inference. In *Proceedings of the Seventh ACM SIGSPATIAL International Workshop on Location-based Social Media*, pp. 1-8. https://doi.org/10.1145/2755492.2755494
- 11. Cao, G.\* (2014): A geostatistical framework for heterogeneous spatatial data fusion. In Proceedings of the 11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences. http://spatialaccuracy.org/wp-content/uploads/2021/07/Paper\_50\_Cao.pdf
- Hwang, M.\*, Wang, S., Cao, G., Padmanabhan, A. and Zhang, Z.(2013): Spatiotemporal transformation of social media: A case study of Twitter for exploration of flu risk indicators. In *Proceedings of the 4th ACM SIGSPATIAL International Workshop on GeoStreaming*, pp. 12-21. https://doi.org/10.1145/2534303.2534310
- 9. Padmanabhan, A.\*, Wang, S., **Cao, G.**, Hwang, H., Zhao, Y., Zhang Z. and Gao Y. (2013): FluMapper: an interactive CyberGIS environment for massive location-based

social media data analysis. IN *Proceedings of the Conference on Extreme Science and Engineering Discovery Environment: Gateway to Discovery*. https://doi.org/10.1145/2484762.2484821

- 8. Shook, E.\*, Leetaru, K, **Cao**, G., Padmanabhan, A and Wang, S. (2012): Happy or not: Generating topic-based geospatial emotional heatmaps for Culturomics using CyberGIS. *IEEE 8th International Conference on E-Science*, pp. 1-6. https://doi.org/10.1109/eScience.2012.6404440
- 7. **Cao, G.\***, Wang, S., and Guan, Q. (2012): A state-space model for understanding spatial dynamics represented by areal data. In *Proceedings of the Seventh International Conference, GIScience* 2012.
- 6. **Cao, G.\***, Kyriakidis, P.C., and Goodchild, M.F. (2011): A geostatistical framework for categorical spatial data modeling, in *Proceedings of the 19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pp. 4-9. https://doi.org/10.1145/2078296.2078298
- 5. Kyriakidis, P.C.\* and **Cao**, **G** (2010): Generating fine resolution area class maps subject to coarser resolution data constraints. In *Proceedings of the Sixth International Conference*, *GIScience* 2010. https://giscience2010.org/pdfs/paper\_221.pdf
- 4. **Cao, G.\***, Kyriakidis, P.C., and Goodchild, M.F. (2009): Prediction and simulation in categorical fields: a transition probability combination approach, in *Proceedings of the 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pp.496-499. https://doi.org/10.1145/1653771.1653853
- 3. **Cao**, **G**.\*, and Kyriakidis, P.C. (2008): Combining transition probabilities in the prediction and simulation of categorical fields, in: J. Zhang, and M.F. Goodchild (Eds.), *Proceedings of the 8th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Shanghai, China, June 2008, pp.25-32.
- Li, K.\*, Zhong, E., Song, G., Cao, G., Zhang, L. and Wu, Q. (2007): NDF: An effective mobile GIS physical storage model. In *Proceedings of the Geoinformatics* 2007: *Geospatial Information Technology and Applications*. https://doi.org/10.1117/12.764932
- 1. Zhang, X.\*, **Cao**, **G**. and Zhang, L. (2006): Research and improvement on optimal path analysis algorithm based on cost-distance grid. In *Proceedings of the IEEE International Conference on Geoscience and Remote Sensing Symposium*, pp.869-871. https://doi.org/10.1109/IGARSS.2006.223

#### **Technical Report**

1. **Cao, G.\***, Kyriakidis, P.C., and Goodchild, M.F. (2013): On spatial transition probabilities as continuity measures in categorical fields. (Available at: http://arxiv.org/abs/1312.5391)

#### In Conference Proceedings (not peer-reviewed)

1. <u>Cao</u>, G.\*, Yu, Z., Yang, Z. (2002): Spatially visualized Internet management system based on GIS technologies. *Proceedings of International Conference on Computer Graphics & Spatial Information System*, Beijing, China, August 2002

## **II.C** Professional Presentations

(*+ indicates advisee author*(*s*), *presenter is underlined*)

#### In Conferences and Symposia

- 55. Song, W., Cong, Z. and Cao, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST-NSF Disaster Resilience Research Symposium*. Virtual event. August 20-21, 2024
- 54. **Cao, G.**: Uncertainty Modeling in GeoAI. The International Symposium of Spatiotemporal Data Science. Virginia Tech Research Center. July 22-24, 2024
- 53. **Cao, G.** and Li, G.<sup>†</sup>: Generative adversarial models for extreme downscaling of geospatial datasets. The 7th International Conference on Econometrics and Statistics (EcoSta 2024). Beijing Normal University, Beijing, China. July 2024
- 52. **Cao, G.** and Li, G.<sup>†</sup>: Generative adversarial models for extreme super-resolution of climate datasets. Evaluating the Science of Geospatial AI. Harvard University, Cambridge, MA. May 2024
- 51. J. Zhou<sup>+</sup> and **Cao**, G.: Understanding the relative risk of morbidity and its disparities attributable to air pollution exposure. AAG 2024. Honolulu, HI. Apr. 2024
- 50. <u>G. Li</u><sup>+</sup> and **Cao**, G.: Bayesian Super-Resolution of Climate Datasets with Deep Generative Models. AAG 2024. Honolulu, HI. Apr. 2024
- 49. <u>Cao</u>, G. and G. Li<sup>+</sup>: Uncertainty Modeling in GeoAI. AAG 2024. Honolulu, HI. Apr. 2024
- 48. <u>A. Ma</u><sup>†</sup>, A. Filippi, I. Guneralp, X. Chen and **Cao**, G.: A LSTM-based classification framework for floodplain land-cover mapping using single-image-based sequential feature extraction. AGU 2023. San Francisco, CA. Dec. 2023
- 47. Z. Cong, D. Liang, W. Song and **Cao**, G.: Multidimensional tornado exposure and climate change risk perceptions. *APHA 2023 Annual Meeting and Expo*. Atlanta, GA. November 2023
- 46. <u>Li, G.</u><sup>+</sup> and **Cao**, G.: Bayesian Super-Resolution of Geospatial Datasets with Deep Generative Models. *Geospatial Knowledge Graphs and GeoAI Workshop, GIScience* 2023. Leeds, UK. September 2023

- 45. Song, W., Cong, Z. and Cao, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST-NSF Disaster Resilience Research Symposium*. Virtual event. August 23-24, 2023
- 44. Li, G.<sup>+</sup> and **Cao**, G.: Generative adversarial models for extreme super-resolution of climate datasets. *AAG 2023*. Denver, CO. March 2023
- 43. <u>Cao</u>, G. and Li, G.<sup>+</sup>: A deep learning-based geostatistical framework for geospatial uncertainty modeling. *AAG* 2023. Denver, CO. March 2023
- 42. **Cao**, G.: Geospatial Uncertainty Modeling in GeoAI. *Specialist Meeting on Digital Twins*. ASU, Tempe, AZ. February 2023
- 41. **Cao**, G.: Exploring the health disparity of long-term PM2.5 exposure with advanced PM2.5 mapping and hospital admission records. *AutoCarto 2022*. Redland, CA. November 2022
- 40. **Cao**, G.: Revisiting the estimations of PM2.5-attributable mortality with advancements in PM2.5 mapping and mortality statistics. *GEOMED* 2022. Irvine, CA. October 2022
- 39. Song, W., Cong, Z. and **Cao**, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST-NSF Disaster Resilience Research Symposium*. Virtual event. September 14-15, 2022
- 38. Song, W., Cong, Z. and Cao, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST Disaster Resilience Research Symposium*. Virtual event. July 20-21, 2021
- <u>Cao</u>, G. and Y. Liu<sup>+</sup>: Integrated use of machine learning and geostatistics for high resolution mapping of ground-level PM2.5 concentrations. 22nd Conference on Geo-information Science, Limassol, Cyprus. June 2019
- 36. <u>Cao</u>, G.: A deep learning-based geostatistical framework for geospatial data analysis and modeling *Annual Meeting of American Association Geographers*, Washington DC. April 2019
- 35. <u>Cao</u>, G.: A statistical framework of functional data analysis for modeling positional uncertainty of geographic information. *Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Beijing, China. May 2018
- 34. <u>**Cao**</u>, G.: High resolution mapping of ground-level *PM*<sub>2.5</sub> concentrations. *Annual Meeting of American Association Geographers*, New Orleans, LA. April 2018
- 33. <u>Cao</u>, G.: Uncertainty modeling in geospatial data science. *NSF SI2-S2I2 Conceptualization: Geospatial Software Institute*, Los Angeles, CA. January 2018
- <u>Cao</u>, G.: High resolution mapping of ground-level *PM*<sub>2.5</sub> concentrations. *The Third International Conference on CyberGIS and Geospatial Data Science*, Boston, MA. April 2017

- 31. <u>Cao</u>, G.: Explore spatiotemporal and demographic characteristics of human mobility via location-based social media. *NSF Workshop on Advancing Movement and Mobility Science by Bridging Research on Human Mobility and Animal Movement Ecology*, Columbus, Ohio. May 2017
- 30. <u>Cao</u>, G.: Learning deep of remote sensing imagery for high-resolution mapping of ground-level *PM*<sub>2.5</sub> concentrations. *Annual Meeting of American Association of Geographers*, Boston, MA. April 2017
- 29. <u>Cao</u>, G.: Statistical modeling of animal movement trajectory: A functional data analysis approach. *NSF Workshop on Advancing Movement and Mobility Science by Bridging Research on Human Mobility and Animal Movement Ecology*, Austin, TX. November 2016
- 28. <u>Cao</u>, G.: High resolution mapping of ground-level *PM*<sub>2.5</sub> concentrations. *The Third International Conference on CyberGIS and Geospatial Data Science*, Urbana, IL. July 2016
- 27. <u>Cao</u>, G.: Exploring biases in location-based social media. *International Workshop of Cloud Computing and Big Data*, Fairfax, VA. July 2016
- 26. <u>Cao</u>, G.: Integrating CyberGIS for spatiotemporal uncertainty modeling. *CyberGIS All Hands Meeting*, Reston, VA. September 2015
- 25. <u>Cao</u>, G.: Representing spatiotemporal uncertainty in function spaces. *110th Annual Meeting of the Association of American Geographers*, Chicago, IL. April 2015
- 24. <u>Y. Liu</u><sup>+</sup> and **Cao**, G.: Geostatistical downscaling of gridded PM2.5 concentration datasets using nighttime light imagery. *110th Annual Meeting of the Association of American Geographers*, Chicago, IL. April 2015
- 23. Liu, Y.<sup>+</sup>, Luo, F.<sup>+</sup> and <u>Cao</u>, G.: Track spatiotemporal spread of public concerns on Ebloa in the US via Twitter. *The 13th International Conference of Geocomputation*, Dallas, TX. May 2015
- 22. <u>Luo</u>, F.<sup>+</sup>, **Cao**, G., and Li, X.: An interactive approach for deriving geometric network models in 3D indoor environments. *ACM GIS 2014*, Dallas, Texas. November 2014
- 21. Huang, Q., **Cao**, G., and Wang, C.: From where do Tweets originate?-A GIS approach for user location inference. *ACM GIS 2014*, Dallas, Texas. November 2014
- <u>Cao</u>, G., Wang, S.: A scalable framework for spatiotemporal analysis of location-based social media data 109th Annual Meeting of the Association of American Geographers, Tampa, FL. April 2014
- 19. <u>Cao</u>, G.: A geostatistical framework for heterogeneous spatatial data fusion, 11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Lansing, Michigan. July 2014

- 18. Hwang, M., Wang, S., **Cao**, G., Padmanabhan, A. and Zhang, Z.: spatiotemporal transformation of social media: A case study of Twitter for exploration of flu risk indicators. *ACM GIS 2013*, Orlando, Florida. November 2013
- 17. <u>Cao</u>, G.and Wang, S.: A statistical framework for spatiotemporal dynamics modeling. *AAG 2013*, Los Angels, CA. April 2013
- <u>Cao</u>, G., Wang, S., and Guan, Q.: A state-space model for understanding spatial dynamics represented by areal data. *GIScience* 2012, Columbus, Ohio. September 2012
- 15. <u>Cao</u>, G., Wang, S.: A CyberGIS-enabled statistical framework for spatiotemporal data fusion *The First International Conference on Space, Time and CyberGIS*, Champaign, Illinois. August 2012
- 14. <u>Cao</u>, G., Goodchild, M.F., Wang, S., Kyriakidis, P.C.,: A spatial multinomial logistic mixed model for mapping thematic classification uncertainty. *107th Annual Meeting of the Association of American Geographers*, New York City, New York. February 2012
- 13. <u>Cao</u>, G., Kyriakidis, P.C., Goodchild, M.F.: A geostatistical framework for categorical spatial data modeling. *The 19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Chicago, Illinois. November 2011
- <u>Cao</u>, G., Goodchild, M.F., Kyriakidis, P.C.: A multinomoial mixed model for prediction of categorical saptial data. *National Geospatial-Intelligence Agency Academic Research Program Symposium (NARP)*, National Academy of Sciences, Washington, D.C., September 2011
- 11. <u>Cao</u>, G., Goodchild, M.F., Kyriakidis, P.C.: A computer package for modeling, prediction and simulation of categorical spatial data. *107th Annual Meeting of the Association of American Geographers*, Seattle, WA. April 2011
- 10. <u>Marston</u>, J. R., **Cao**, G., Brabyn, J. A. Evaluation of an online mapping program with user-defined map features for persons with low vision. *First European Congress On Visual Impairment*, Valladolid, Spain. October 2010
- 9. <u>Cao</u>, G., Goodchild, M.F., Kyriakidis, P.C.: A geostatistical framework for geospatial data analysis and modeling across multiple spatial and temporal scales. *National Geospatial-Intelligence Agency Academic Research Program Symposium (NARP)*, National Academy of Sciences, Washington, D.C., September 2010
- 8. Kyriakidis, P.C. and **Cao**, G: Generating fine resolution area class maps subject to coarser resolution data constraints, in *Proceedings of the Sixth International Conference*, *GIScience* 2010, Zurich, Switzerland. Sep.14-17,2010
- 7. <u>Cao</u>, G., Kyriakidis, P.C., Goodchild, M.F.: Transition probability-based geostatistical methods for modeling categorical spatial data. *106th Annual Meeting of the Association of American Geographers*, Washinton, D.C., March 2010

- 6. <u>Marston</u>, J.R. and **Cao**, G.: Making geographical information accessible for people with low vision. *106th Annual Meeting of the Association of American Geographers*, Washinton, D.C., March 2010
- 5. <u>Cao</u>, G., Kyriakidis, P.C., Goodchild, M.F.: Prediction and simulation in categorical fields: A transition probability combination approach. *The 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Seattle, Washington. November 2009
- 4. <u>Cao</u>, G., Kyriakidis, P.C., Goodchild, M.F.: Prediction and simulation in categorical fields: A transition probability combination approach. 2009 Annual Conference of the International Association for Mathematical Geosciences, Stanford, CA. August 2009
- 3. <u>Cao</u>, G., and Kyriakidis, P.C.: Combining transition probabilities in the prediction and simulation of categorical fields. *105th Annual Meeting of the Association of American Geographers*, Las Vegas, NV. March 2009
- <u>Cao</u>, G., and Kyriakidis, P.C.: Combining transition probabilities in the prediction and simulation of categorical fields, *The 8th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Shanghai, China. June 2008
- 1. <u>Cao</u>, G.: Distributed GIS based on Google's MapReduce. *104th Annual Meeting of the Association of American Geographers*, Boston, MA. April 2008

#### Invited Talks and Colloquia Presentations

- 10. <u>Cao</u>, G.: Integrating social sensing and remote sensing for understanding socioeconomic dynamics. *CU Info Seminar Series*. Boulder, CO. April 2022
- 9. <u>Cao</u>, G.: Integrating social sensing and remote sensing for understanding socioeconomic dynamics. *Rutgers University*. New Brunswick, NJ. January 2020
- 8. <u>Cao</u>, G.: Integrating social sensing and remote sensing for understanding socioeconomic dynamics. *Florida State University*. Tallahassee, FL. December 2019
- 7. <u>Cao</u>, G.: Spatiotemporal analysis of location-based social media data. *Zhejiang University*. Hangzhou, Zhejiang, China. June 2018
- <u>Cao</u>, G.: A scalable framework for scalable spatiotemporal analysis of location-based social media data. *Texas Tech University* 2015 Symposium on Big Data. Lubbock, Texas. April 2015
- 5. <u>Cao</u>, G.: A scalable framework for spatiotemporal analysis of location-based social media data. *Chinese University of Geosciences*, Wuhan, Hubei, China. June 2014
- 4. <u>Cao</u>, G.: A scalable framework for spatiotemporal analysis of location-based social media data. *Institute of Geographic Research and Natural Resource Research, Chinese Academy of Sciences*, Beijing, China. June 2014

- 3. <u>Cao</u>, G.: A geostatistical framework for categorical spatial data modeling. *Department of Geography, University of Illinois at Urbana-Champaign,* Urbana, IL. October 2011
- 2. <u>Marston</u>, J. R., **Cao**, G., Brabyn, J. A.: Accessible maps customized for visually impaired persons. *Atlanta Vision Seminar*, Atlanta, GA. October 2010
- <u>Cao</u>, G.: Markov chain-based geostatistical methods for modeling categorical spatial data. *Geography Department Colloquium*, UC Santa Barbara. Santa Barbara, CA. October 2007

## **II.D** Software & Data Products

(+ indicates advisee or mentee author(s))

#### **Software Products**

- 2. **Cao**, G.: SMC: A Matlab/Octave toolbox for statistical modeling of spatial categorical data. (Available at GitHub)
- 1. Li, G.<sup>+</sup> and **Cao**, G. : STAR: A Python toolbox for deep learning-based geostatistical modeling of spatiotemporal data. (Available at GitHub)

#### **Data Products**

- 4. Zhao, N.<sup>+</sup> and **Cao**, G. : A times series of datasets of Chinese urban boundaries derived from nighttime remote sensing imagery (for the years of 2004, 2006, 2008 and 2010, available at GitHub)
- 3. Liu, Y.<sup>+</sup>, Zhao, N.<sup>+</sup> and **Cao**, G.: A time series of high-resolution (1km) gridded datasets of PM<sub>2.5</sub> concentration of the United States 2000-2015. (Available at GitHub)
- 2. Zhao, N.<sup>+</sup>, Liu, Y.<sup>+</sup> and **Cao**, G.: A times series of high-resolution (1km) gridded datasets of the projected GDP of China between 2014-2020. (Available at GitHub)
- 1. Zhao, N.<sup>+</sup>, **Cao**, G., and J. Vanos: Estimated weekly influenza incidences (ILI+) across 79 major cities of the United States by combining Google Flu Trends and CDC's virologic surveillance reports. (January 2005 to December of 2014, Available at GitHub)

## **II.E Selected Media Mentions**

 "40 maps that explain the world" by Washington Post: the 25th map in https://www.washingtonpost.com/news/worldviews/wp/2013/08/12/ 40-maps-that-explain-the-world/

- 3. http://www.poynter.org/news/mediawire/213847/ study-twitter-has-a-distinct-geographic-profile-from-mainstream-media/
- 2. http://globalnews.ca/news/613788/ researchers-map-the-geography-of-twitter-with-geo-referencing/
- 1. http://news.abs-cbn.com/lifestyle/06/17/13/ manila-among-top-20-most-tweeting-cities

# III. TEACHING

## **III.A** Course offerings

#### University of Colorado Boulder

- 4. Geog 4403/5403: Space-Time Analytics (new development)
  - Spring 2022, Spring 2023, Spring 2024
- 3. Geog 3023: Statistics for Geography (major re-development)
  - Fall 2020, Fall 2021
- 2. Geog 4023/5023: Advanced Quantitative Methods in Geography (major re-development)
  - Spring 2021, Spring 2023, Spring 2024
- 1. Geog 4103/5103 Spatial Analytics
  - Spring 2021, Spring 2023

#### Texas Tech

- 3. GEOG 5330: Applied Spatial and Spatiotemporal Analysis (new development)
  - Fall 2016, Fall 2017, Fall 2018
- 2. GEOG 3340: Introduction to Human Geography Research
  - Fall 2015
- 1. GIST 4302/5302: Spatial Analysis and Modeling:
  - Fall 2013, Spring 2014, Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2017, Spring 2018, Fall 2018

#### University of Illinois at Urbana-Champaign

- 2. Geog 480: Principles of GIS
  - Spring 2013
- 1. Course Development of Geog 379: Introduction to GIS (online course)
  - Summer 2012

## **III.B** Advising and Mentoring

(\* indicates serving as the co-Chair of the Committee)

#### **Postdoctoral Scholar**

- 3. Dr. Di Wu: Dept. of Geography, CU Boulder (to start in July 2024)
- 2. Dr. Andong Ma: Dept. of Geography, CU Boulder (2021-2023). Current employment: Visiting Assistant Professor at Texas A&M University
- 1. Dr. Naizhuo Zhao: Center for Geospatial Technology and Department of Geosciences, Texas Tech (2016-2018). Current employment: Full Professor at Northeastern University (of China)

#### **Chair of Doctoral Dissertation Committees**

#### University of Colorado Boulder

- 4. Yangchengsi Zhang Dept. of Geography, CU Boulder (Fall 2024-). Dissertation topic: *Geospatial Foundation Models for Uncertainty-Aware Geospatial Knowledge Discovery (tentative)*
- 3. Zhou Yu: Dept. of Geography, CU Boulder (Fall 2023-). Dissertation topic: *Geostatistical Modeling of Spatiotemporal Extremes*
- 2. Jiacheng Zhou: Dept. of Geography, CU Boulder (Fall 2022-). Dissertation topic: *Health Effects of Combined Exposure to Air Pollution, Extreme Heat and Natural Hazards on Aging Populations*
- 1. Guiye Li: Dept. of Geography, CU Boulder (Fall 2021-). Dissertation topic: *Deep Learning-Based Geostatistics for Geospatial Uncertainty Modeling*

#### <u>Texas Tech</u>

4. Ying Liu: Dept. of Geosciences, Texas Tech (Completed in Summer 2018). Dissertation: *High-resolution Mapping of Ground-Level Fine Particulate Matter and the Associated Human Health Risks* (Doctoral Dissertation Completion Fellowship Awardee)

Current employment: Postdoc Fellow at the University of Montreal

3. Hasan Almekdash\* (co-chair with Dr. Valerie Paton): Higher Education, Texas Tech (Completed in Summer 2018). Dissertation: *Visualizing, Analyzing, and Modeling Data in Quantitative Higher Educational Research Using Geospatial Technologies: A Spatial Analysis of Texas Public School District Factors and Four-Year College Degree Completion* 

Current employment: Assistant Professor, Baylor College of Medicine

2. Feixiong Luo: Dept. of Geosciences, Texas Tech. Entered the program in Fall 2014; did not complete the degree

Current employment: ByteDance

1. Jimin Chun\* (co-chair with Dr. Jeff Lee): Dept. of Geosciences, Texas Tech. Stepped off as co-chair in Fall 2020

#### Member of Doctoral Dissertation Committees

#### University of Colorado Boulder

- 8. Lauren Herwehe (supervisor: John O'Loughlin): Department of Geography, CU Boulder (Spring 2024-)
- 7. Naia Ormaza Zulueta (supervisor: Zia Mehrabi): Department of Environmental Studies, CU Boulder (Spring 2024-)
- 6. John Dzwonczyk(supervisor: John O'Loughlin): Department of Geography, CU Boulder (Spring 2024-)
- 5. Taylor Johaneman (supervisor: Katherine Lininger): Department of Geography, CU Boulder (Fall 2023-)
- 4. Emma Rieves (supervisor: Colleen Reid): Department of Geography, CU Boulder (Fall 2022-)
- 3. Sarah Posner (supervisor: John O'Loughlin): Department of Geography, CU Boulder (Fall 2021-Spring 2024; step off after comprehensive exam)
- 2. Zhongying Wang (supervisor: Morteza Karimzadeh): Department of Geography, CU Boulder (Fall 2021-)
- 1. Behzad Vahedi (supervisor: Morteza Karimzadeh): Department of Geography, CU Boulder (Fall 2020-)

#### Texas Tech

- 8. Saeed Moradi (supervisor: Ali Nejat): Civil Engineering, Texas Tech (Completed in Fall 2019)
- 7. Lucy Lim (supervisor: David Klein): Environmental Toxicology, Texas Tech (Completed in Spring 2019)
- 6. Mehdi Jamali (supervisor: Ali Nejat): Civil and Environmental Engineering, Texas Tech (Completed in Spring 2019)
- 5. Jason Post (supervisor: Perry Carter): Geosciences, Texas Tech (Completed in Fall 2017). Dissertation: *Human Interactions with the Aquatic Ecosystems of The Los Angeles River: The Creation of the LA River as a Human Landscape and the Effect of Exotic Fish on Human Activity*
- 4. Thu Nguyen (supervisor: Jeff Lee): Geosciences, Texas Tech (Completed in Fall 2017). Dissertation: *An Evaluation of Coastal Flooding Risk due to Storm Surge in Sea Level Rise Condition in Thua Thien Hue Province, Vietnam*

- 3. Fahad Abdulaziz F Almutlaq (supervisor: Kevin Mulligan): Geosciences, Texas Tech (Completed in Fall 2017). Dissertation: *Analysis of Dune Morphology within the Rub'al Khali Using Geospatial Technology*
- 2. Marina Fisher-Phelps (supervisor: Tigga Kingston): Biological Sciences, Texas Tech (Completed in Fall 2017). Dissertation: *Historical Records in Species Distribution Models: Impacts on Spatial Bias and Uncertainty*
- 1. Lionel Plummer (supervisor: Robert Cox): Natural Resource Management, Texas Tech (Completed in Fall 2014). Dissertation: *An Examination of Hydrologic Restoration Efforts for Wetland Mitigation Banks*

#### Ph.D. Dissertation External Examiner

1. Azadeh Mousavi (supervisor: Matt Duckham): Dept. of Infrastructure Engineering, University of Melbourne. Dissertation: *Decentralized Data Mining for Event Detection in Spatiotemporal Fields*. (June, 2015)

#### **Chair of Master Thesis Committees**

#### University of Colorado Boulder

1. Ryan Erickson: Dept. of Geography, CU Boulder (Fall 2021-). Thesis topic: Integrating Machine Learning and Geostatistics for High Resolution Mapping of Ozone Concentrations

#### <u>Texas Tech</u>

- Chan-mi Lee\* (co-chair with Dr. Jeff Lee): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2020). Thesis: *Spatiotemporal association between Valley Fever and PM*<sub>10</sub>: A Case Study of Arizona. Current Employment: PhD at Temple University
- Congliang Zhou: Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2019). Thesis: *Deep Learning of Geospatial Patterns for Remote Sensing Image Downscaling*. Current Employment: Assistant Professor at Louisiana State University
- 3. Alexandria Herdt\* (co-chair with Dr. Jennifer Vanos): Atmospheric Science, Dept. of Geosciences, Texas Tech (Completed in Summer 2017). Thesis: *A Multi-Index Investigation of the Spatiotemporal Relationships Between Heat and EMS Calls During the 2015 Pan American Games in Toronto, Canada*
- 2. Ashley Morris: Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2017). Thesis: *Mapping Local Community Preparedness to Tornado Hazards in Lubbock, Texas*
- 1. Morgan Kraft: Geography, Dept. of Geosciences, Texas Tech (Completed in Summer 2016). Thesis: *Exploring Biases in Location-Based Social Media A Case Study of Twitter in the 2012 U.S. Presidential Election*

#### Member of Master Thesis Committees

#### University of Colorado Boulder

- 5. Kate Little (supervisor: Colleen Reid): Department of Geography, CU Boulder (Spring 2024-)
- 4. Buddy Collins (supervisor: Stefan Leyk): Dept. of Geography, CU Boulder (in progress)
- 3. Andrew Eiswerth (supervisor: John O'Loughlin): Dept. of Geography, CU Boulder (Completed in Spring 2022)
- 2. Margaret Digiorno (supervisor: Michael Gooseff): Dept. of Civil, Environmental and Architectural Engineering, CU Boulder (Completed in Spring 2022)
- 1. Emma Rieves (supervisor: Colleen Reid): Dept. of Geography, CU Boulder (Completed in Spring 2022)

#### <u>Texas Tech</u>

- 7. Cole Edwards (supervisor: Kevin Mulligan): Geography, Texas Tech (Completed Summer 2019)
- 6. Hannah Greenberg (supervisor: Steven Presley): Environmental Toxicology, Texas Tech (Completed in Spring 2018). Thesis:Geospatial Assessment and Species Distribution Modelling of Aedes aegypti and Aedes albopictus, Potential Zika Virus Vectors, in the United States with an Emphasis on Current and Predicted Distribution in Texas
- 5. Vaughn Smith (supervisor: Carlos Portillo-Quintero): Natural Resource Management, Texas Tech (Completed in Fall 2017). Thesis: *Near real-time monitoring of tropical dry forests in Latin and Central America*
- 4. Evan Levine (supervisor: Gary Elbow): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2016). Thesis: *A Geospatial Contextualization of Archaic Greek Epigram on Thasos*
- 3. Aaron Hardin (supervisor: Jennifer Vanos): Atmospheric Science, Dept. of Geosciences, Texas Tech (Completed in Summer 2015). Thesis: *Assessment of Urban Heat Islands During Hot Weather in the U.S. Northeast and Linkages to Microscale Thermal and Radiational Properties.*
- 2. Jason Post (supervisor: Perry Carter): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2014). Thesis: *Environmental Inequality in Lubbock Texas*
- 1. Tiffany Lambert (supervisor: Jeff Lee): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2014). Thesis: *Analysis of Marine Stratus Surges in the Pacific Northwest*

#### **Undergraduate Student Mentorship**

#### University of Colorado Boulder

- 5. Bryan Gager: Dept. of Ecology and Evolutionary Biology, CU Boulder (Member of honor thesis committee, Fall 2024- )
- 4. Matthew Woodland: Dept. of Geography, CU Boulder (Research assistant, Spring 2022-Fall 2023)
  - **UROP project** (Summer 2023): *Characterizing Spatiotemporal Changes of Wildland Urban Interfaces in the United States*
- 3. Maile Rhea: Dept. of Anthropology, CU Boulder (Member of honor thesis committee, defended in Spring 2024)
- 2. Keely Lawrence: Dept. of Geosciences, CU Boulder (Member of honor thesis committee, defended in Fall 2021)
- 1. Trevor Bloom: Dept. of Geography, CU Boulder (Independent study, Summer 2021)

#### <u>Texas Tech</u>

1. John Wells: Geography, Dept. of Geosciences, Texas Tech (Independent study, Spring 2016)

# IV. SERVICE

## IV.A Department, College and University

#### University of Colorado Boulder:

- 6. Search Committee of Environmental Data Science position, Dept. of Geography and CIRES, Fall 2023
- 5. Member of Personnel Committee, Dept. of Geography, 2021-
- 4. Member of Computing Committee, Dept. of Geography, 2020-2021
- 3. Class Evaluation (Dr. Rachel Isaacs), Dept. of Geography, Fall 2022
- 2. Class Evaluation (Dr. Jessica Finlay), Dept. of Geography, Fall 2023
- 1. Class Evaluation (Sarah Scholsser), Dept. of Geography, Spring 2024

#### Texas Tech:

- 10. Textbook Committee in the Department of Geosciences, Fall 2019
- 9. Third Year Review Committee of Dr. Branimir Segvic in the Department of Geosciences, Fall 2019
- 8. Search Committee of Remote Sensing position in the Department of Geosciences, Spring 2018
- 7. Search Committee of Atmospheric Science position in the Department of Geosciences, Spring 2017
- 6. Search Committee of Climate Science position in the Department of Geosciences, Spring 2015
- 5. Organizer of Geography Seminar in the Department of Geosciences
- 4. Dean's Representative of Dissertation Defense: Yuepeng Cui (Civil Engineering)
- 3. Dean's Representative of Dissertation Defense: Hoonill Won (Wind Science and Engineering)
- 2. Dean's Representative of Dissertation Defense: Liann Gallagher (Political Science)
- 1. Dean's Representative of Dissertation Defense: Ali Jamali (Petroleum Engineering)

## **IV.B** Professional Communities

#### Editorial

#### Special Issue Editor:

1. N. Zhao, G., Cao, T. Ghosh and Q. Zhang, Remote Sensing for Mapping Economic Activities (2021 - 2023). *Remote Sensing*.

#### Service as Referee and Panelist

#### Panelist for Funding Agencies

- 3. National Science Foundation (NSF) CSSI, 2022
- 2. Department of Homeland Security, 2022
- 1. NSF SSI, 2016

#### Referee for Research Proposals

- 10. National Research Foundation of Singapore
- 9. Israeli Science Foundation
- 8. NSF Geoinformatics Program
- 7. NSF MMS Program
- 6. NSF GSS Program
- 5. NSF HEGS Program
- 4. NSF DIBBs Program
- 3. NSF Science of Sciences
- 2. National Center for Atmospheric Research (NCAR) Innovator Program
- 1. Louisiana Board of Regents Support Fund

Referee for Book Proposals, Scientific Journals and Professional Conferences (selected)

- 26. Cambridge Press (book proposal)
- 25. Nature Sustainability
- 24. Remote Sensing of Environment
- 23. Environmental Science & Technology
- 22. IEEE Transactions on Geosciences and Remote Sensing
- 21. International Journal of Geographical Information Science
- 20. International Journal of Applied Earth Observation and Geoinformation
- 19. Cartography and Geographic Information Science
- 18. GIScience & Remote Sensing
- 17. PLOS ONE

- 16. Atmospheric Environment
- 15. ISPRS Journal of Photogrammetry and Remote Sensing
- 14. International Journal of Disaster Risk Reduction
- 13. IEEE Transactions on Parallel and Distributed Systems
- 12. Applied Geography
- 11. Environmetrics
- 10. The Annals of the American Association of Geographers
- 9. Transactions in GIS
- 8. Geoinformatica
- 7. Journal of Geographical Systems
- 6. Computers, Environment and Urban Systems
- 5. Science of Total Environment
- 4. Mathematical Geosciences
- 3. International Journal of Digital Earth
- 2. International Journal of Remote Sensing
- 1. Stochastic Environmental Research and Risk Assessment

#### **Conference Program Committee Member and Session Organizer**

#### Program Committee

- 8. CAGIS+UCGIS Symposium 2024
- 7. GeoAI and Deep Learning Symposium, Annual Meeting of AAG 2023, 2024
- 6. The 1st workshop on Bridge-AI: From Climate Change to Health Equity (BridgeAICCHE) 2023
- 5. The 14th International Conference on Geostatistics for Environmental Applications (geoENV) 2020-
- 4. The Association of Geographic Information Laboratories in Europe (AGILE) 2019 -
- ACM GIS International Workshop on Location-based Social Networks 2014, 2015, 2016

- 2. CyberGIS Symposium, Annual Meeting of American Association of Geographers (AAG) 2015
- 1. The Third International Conference on CyberGIS and Geospatial Data Science, 2016

#### Session Organizer

- 6. GeoAI for Spatial Analytics and Modeling, Annual Meeting of AAG 2023, 2024
- 5. Deep Learning for Geospatial Patterns & Applications, Annual Meeting of AAG 2018, 2019, 2022
- 4. Classification Methods and Accuracy Assessment in Land Cover Mapping, Annual Meeting of AAG, 2016
- 3. CyberGIS and Spatiotemporal Uncertainty, Annual Meeting of AAG 2015, 2016
- 2. CyberGIS and Digital Epidemiology, Annual Meeting of AAG 2014
- 1. Computational and Statistical Methods for Spatiotemporal Data Analytics, Annual Meeting of AAG 2012, 2013

#### Membership and Services in Professional Organizations

2024-	Board of Directors, University Consortium for Geographic Information Science (UCGIS)
2020-	CU Delegate, UCGIS
2007-	Association of American Geographers
2017-	Chinese Professionals in Geographic Information Systems (CPGIS)
2018-2020	Board of Directors, Chinese Professionals in Geographic Information Systems (CPGIS)
2008-2010	International Spatial Accuracy Research Association
2009-2011	ACM SIGSPATIAL
2015-2016	International Society of Biometeorology
2015-2016	Americal Geophysical Union
2009-2010	International Association for Mathematical Geosciences