Xiaokang Fu

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Research Interest

My research is dedicated to advancing sustainable development through innovative technologies and interdisciplinary collaboration. My interests including geographic information science (GIS), geospatial artificial intelligence (GeoAI), environmental management, disaster response, public health, urban computing, social behavior analysis, and the development of reproducible and scalable computational tools.

Education

2015-2020	**Ph.D.**, Cartography and Geographic Information Engineering, Wuhan University
2013-2015	**M.A.**, Surveying and Mapping Engineering, Wuhan University
2009-2013	**B.Sc.**, Surveying and Mapping Engineering, Inner Mongolia University of Science and Technology

Research Experience

2023-now	Postdoc, Center for Geographic Analysis, Harvard University, (Advisor: Dr. S. V. Subramanian)
2021-2023	Visiting Fellow, Center for Geographic Analysis, Harvard University, (Advisor: Dr. S. V. Subramanian)
2020-2023	Postdoc, State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing, Wuhan University, (Advisor: Dr. Jianya Gong)

Publications

G Google Scholar
† → Equal contribution

Journal Articles

J1. Vitagliano, J. A., Kavanaugh, J. R., Gorges, B., **Fu, Xiaokang**, Todd, K., Milliren, C. E., Raffoul, A. & Austin, S. B. The STRIPED Dietary Supplement Label Explorer: A Tool to Identify Supplements Sold with Weight-Loss, Muscle-Building, and Cleanse/Detox Claims. English. *The Journal of Nutrition* 0. https://pubmed.ncbi.nlm.nih.gov/39954739 (2025).

J2. **Fu, Xiaokang**, Lingbo, L., Guan, W., Kalra, Y., Bao, S., Kötter, T. & Sturm, K. Advancing replicable and reproducible giscience: An approach with KNIME. *Cartography and Geographic Information Science*. https://doi.org/10.1080/15230406.2024.2446556 (2024).

*Expected.

J3. Liu, L., **Fu, Xiaokang**, Kötter, T., Sturm, K., Haubold, C., Guan, W. W., Bao, S. & Wang, F. Geospatial Analytics Extension for KNIME. *SoftwareX* 25. Publisher: Elsevier, 101627. https://www.sciencedirect.com/science/article/pii/S2352711023003230 (2024).

J4. Liu, L., Wang, F., **Fu, Xiaokang**, Kötter, T., Sturm, K., Guan, W. W. & Bao, S. Elevating the RRE Framework for Geospatial Analysis with Visual Programming Platforms: An Exploration with Geospatial Analytics Extension for KNIME. *International Journal of Applied Earth Observation and Geoinformation* 130. Publisher: Elsevier, 103948. https://www.sciencedirect.com/science/article/pii/S1569843224003029 (2024).

J5. Wang, S., Huang, X., Liu, P., Zhang, M., Biljecki, F., Hu, T., **Fu, Xiaokang**, Liu, L., Liu, X. & Wang, R. Mapping the landscape and roadmap of geospatial artificial intelligence (GeoAI) in quantitative human geography: An extensive systematic review. *International Journal of Applied Earth Observation and Geoinformation* 128. Publisher: Elsevier, 103734. https://www.sciencedirect.com/science/article/pii/S1569843224000888 (2024).

J6. **Fu, X.**, Kakkar, D., Chen, J., Moynihan, K. M., Hegland, T. A. & Blossom, J. a Comparative Study of Methods for Drive Time Estimation on Geospatial Big Data: a Case Study in USA. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* 48. https://par.nsf.gov/biblio/10492127 (2023).

J7. Wang, D., Wang, Y., **Fu, Xiaokang**, Dou, M., Dong, S. & Zhang, D. Revealing the spatial co-occurrence patterns of multi-emotions from social media data. *Telematics and Informatics* 84. Publisher: Elsevier, 102025. https://www.sciencedirect.com/science/article/pii/S0736585323000898 (2023).

J8. Wang, S., Ning, H., Huang, X., Xiao, Y., Zhang, M., Yang, E. F., Sadahiro, Y., Liu, Y., Li, Z., Hu, T., **Fu, Xiaokang**, Li, Z. & Zeng, Y. Public Surveillance of Social Media for Suicide Using Advanced Deep Learning Models in Japan: Time Series Study From 2012 to 2022. *J Med Internet Res* 25, e47225. ISSN: 1438-8871. https://www.jmir.org/2023/1/e47225 (June 2023).

J9. Liu, L., Wang, R., Guan, W. W., Bao, S., Yu, H., **Fu, Xiaokang** & Liu, H. Assessing reliability of Chinese geotagged social media data for spatiotemporal representation of human mobility. *ISPRS International Journal of Geo-Information* 11. Publisher: MDPI, 145. https://www.mdpi.com/2220-9964/11/2/145 (2022).

J10. Zhang†, M., Wang†, S., Hu†, T., **Fu†, Xiaokang**, Wang, X., Hu, Y., Halloran, B., Li, Z., Cui, Y., Liu, H., Liu, Z. & Bao, S. Human mobility and COVID-19 transmission: a systematic review and future directions. en. *Annals of GIS* 28, 501–514. ISSN: 1947-5683, 1947-5691. https://www.tandfonline.com/doi/full/10.1080/19475683.2022.2041725 (Oct. 2022).
– Best Paper Award (Annals of GIS, 2023).

J11. Hu, T., Wang, S., She, B., Zhang, M., Huang, X., Cui, Y., Khuri, J., Hu, Y., **Fu, Xiaokang**, Wang, X., Wang, P., Zhu, X., Bao, S., Guan, W. & Li, Z. Human mobility data in the COVID-19 pandemic: characteristics, applications, and challenges. en. *International Journal of Digital Earth* 14, 1126–1147. ISSN: 1753-8947, 1753-8955. https://www.tandfonline.com/doi/full/10.1080/17538947.2021.1952324 (Sept. 2021).

J12. Qiao, M., Wang, Y., Wu, S., **Fu, Xiaokang**, Gu, Y. & Dou, M. A realistic and multilevel measurement of citywide spatial patterns of economic segregation based on human activities. *Cities* 110. Publisher: Elsevier, 103067. https://www.sciencedirect.com/science/article/pii/S0264275120314153 (2021).

J13. Wang, P., Ren, H., Zhu, X., **Fu, Xiaokang**, Liu, H. & Hu, T. Spatiotemporal characteristics and factor analysis of SARS-CoV-2 infections among healthcare workers in Wuhan, China. *Journal of Hospital Infection* 110. Publisher: Elsevier, 172–177. https://www.sciencedirect.com/science/article/pii/S0195670121000463 (2021).

J14. Wang, S., Zhang, M., Hu, T., **Fu, Xiaokang**, Gao, Z., Halloran, B. & Liu, Y. A bibliometric analysis and network visualisation of human mobility studies from 1990 to 2020: Emerging trends and future research directions. *Sustainability* 13. Publisher: MDPI, 5372. https://www.mdpi.com/2071-1050/13/10/5372 (2021).

J15. **Fu, Xiaokang**, Wang, Y., Li, M., Dou, M., Qiao, M. & Hu, K. Community evolutional network for situation awareness using social media. *IEEE Access* 8. Publisher: IEEE, 39225–39240 (2020).

J16. Wang, Y., Li, M., **Fu, Xiaokang**, Shao, S. & Liu, H. A New Method to Detect the Development Situation of Disasters Based on Social Media Co-word Network. *Geomatics and Information Science of Wuhan University* 45, 691–698. http://ch.whu.edu.cn/en/article/doi/10.13203/j.whugis20190054 (2020).

J17. Hu, K., Luo, Q., Qi, K., Yang, S., Mao, J., **Fu, Xiaokang**, Zheng, J., Wu, H., Guo, Y. & Zhu, Q. Understanding the topic evolution of scientific literatures like an evolving city: Using Google Word2Vec model and spatial autocorrelation analysis. *Information Processing & Management* 56. Publisher: Elsevier, 1185–1203. https://www.sciencedirect.com/science/article/pii/S0306457318304199 (2019).

J18. Zhang, L., Chen, X., Lu, J., **Fu, Xiaokang**, Zhang, Y., Liang, D. & Xu, Q. Precipitation projections using a spatiotemporally distributed method: a case study in the Poyang Lake watershed based on the MRI-CGCM3. *Hydrology and Earth System Sciences* 23. Publisher: Copernicus Publications Göttingen, Germany, 1649–1666. https://hess.copernicus.org/articles/23/1649/2019/ (2019).

J19. Wang, T., Wang, Y., Zhao, X. & **Fu, Xiaokang**. Spatial distribution pattern of the customer count and satisfaction of commercial facilities based on social network review data in Beijing, China. *Computers, Environment and Urban Systems* 71. Publisher: Elsevier, 88–97. https://www.sciencedirect.com/science/article/pii/S0198971517302843 (2018).

J20. Wang, T., Wang, Y., Zhao, X., **Fu, Xiaokang** & Jiang, B. Network-Constrained Spatial Point Pattern Analysis for Commercial Facilities. *Geomatics and Information Science of Wuhan University* 43, 1746–1752. http://ch.whu.edu.cn/en/article/doi/10.13203/j.whugis20160558 (2018).

J21. Yandong, W., **Fu, Xiaokang** & Li, M. A new social media topic mining method based on co-word network. *Geomatics and Information Science of Wuhan University* 43, 2287–2294. http://ch.whu.edu.cn/en/article/doi/10.13203/j.whugis20180225 (2018).

J22. Wang, Y.-d., **Fu, Xiaokang**, Jiang, W., Wang, T., Tsou, M.-H. & Ye, X.-y. Inferring urban air quality based on social media. *Computers, Environment and Urban Systems* 66. Publisher: Elsevier, 110–116 (2017).

J23. Wang, Y., Jing, T., Jiang, W., Wang, T. & **Fu, Xiaokang**. Modeling urban air quality trend surface using social media data. *Geomatics and Information Science of Wuhan University* 42, 14–20. http://ch.whu.edu.cn/en/article/doi/10.13203/j.whugis20150401 (2017).

J24. Zhang, L., Lu, J., Chen, X., Liang, D., **Fu, Xiaokang**, Sauvage, S. & Sanchez Perez, J.-M. Stream flow simulation and verification in ungauged zones by coupling hydrological and hydrodynamic models: a case study of the Poyang Lake ungauged zone. *Hydrology and Earth System Sciences* 21. Publisher: Copernicus GmbH, 5847–5861. https://hess.copernicus.org/articles/21/5847/2017/ (2017).

J25. Jiang, W., Wang, Y., Tsou, M. H. & **Fu, X.** Using geo-targeted social media data to detect outdoor air pollution. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* 41. Publisher: Copernicus GmbH, 553–554. https://isprs-archives.copernicus.org/articles/XLI-B2/553/2016/isprs-archives-XLI-B2-553-2016.html (2016).

J26. Jiang, W., Wang, Y., Tsou, M.-H. & **Fu, Xiaokang**. Using social media to detect outdoor air pollution and monitor air quality index (AQI): a geo-targeted spatiotemporal analysis framework with Sina Weibo (Chinese Twitter). *PloS one* 10. Publisher: Public Library of Science San Francisco, CA USA, e0141185. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141185 (2015).

Working papers

W1. Lin Zhang†, **Xiaokang Fu**† & Huang, X. *Unequal Access to China's Arts and Crafts Markets: Spatial Disparities Between Retired and Non-Retired Groups* Submit @ JAG. 2025.

W2. **Xiaokang Fu**, Liu, L., Li, M., Huang, X. & Chen, B. Y. *Calibration of 2SFCA and i2SFCA. A Case Study from Shenzhen, China Based on Online Physician Appointment Data* Submit @ Cities. 2025.

Tools & Software

Open Source Reproducible and Replicable GIScience

Geospatial Analytics Extension for KNIME: Visual Programming Tools for Reproducible and Replicable GIScience, including read, write, process, analysis, modeling, and visualization geospatial data. (GitHub | Talk in The Symposium on Spatiotemporal Data Science, 2024

Dataverse Extension for KNIME: Visual Programming Tools for interacting with Dataverse platform, including upload, download from or to Dataverse; search, read data from Dataverse. (GitHub | Talk in Dataverse Community Meeting, 2022 and Seminar in Harvard, 2023)

Google Earth Engine Extension for KNIME: Visual Programming Tools for interacting Google Earth Engine Extension. (GitHub | Talk in ABCD-GIS / Geography Colloquium, 2024)

Open Source Geospatial Data Science

Georouting. Routing calculation for Python users, supporting most of the routing tools, including OSRM, Google Maps, Bing Maps, etc. with a unified API. (PyPi | GitHub | Mentioned in AAG, 2023)

Geopandas. Python tools for geographic data. (Contribute 1 Pr | GitHub)

Geospatial Big Data

RapidRoute. Rapid Route is an open-source system developed for estimating travel times.

Billion Object Platform. Real-time geospatial analsyis with billions records. (Report in IQSS News Letter, 2024)

Skills

- Proficient in Python, Julia, SQL, R, and JavaScript, with expertise in PostgreSQL (PostGIS), DuckDB, Heavy.AI, and tools like Scikit-learn, PyTorch for data science, machine learning, and AI development. Skilled in QGIS, ArcGIS, GEE, and KNIME software.
- Skilled in data mining, modeling, network analysis, statistics, and data crawling.
- Skilled in Linux server management, HPC workflows, and containerization technologies like Docker, Kubernetes, and OpenShift. Experienced in AI system and AI agents development, and multi-GPU AI training.
- A strong team player with excellent communication and collaboration skills, I am well-equipped to work with people from different backgrounds.

Presentations

† → Equal contribution

Talks

T1. **Xiaokang Fu**. *Digital humanities infrastructure based on open-source executable workflows—A case study of spatial mobility of premodern Chinese literati.* 2024 AAG Annual Meeting (Honolulu, HI, USA). Link. Apr. 2024.

T2. **Xiaokang Fu**. *Replicable Spatial Data Analysis with Geospatial Analytics for KNIME.* 2024 The Symposium on Spatiotemporal Data Science (Arlington, VA, USA). Link. July 2024.

T3. **Xiaokang Fu** & Kakkar, D. *Inferring urban air quality based on social media* 2023 Free and Open Source Software for Geospatial Conference (Prizren, Kosovo). Link. June 2023.

T4. **Xiaokang Fu**, L. L. & Li, M. *Validation, calibration, and estimation of 2SFCA and i2SFCA. A case study from Shenzhen, China based on online appointment data.* 2023 AAG Annual Meeting (Denver, CO, USA). Link. Mar. 2023.

T5. **Xiaokang Fu**. *Inferring urban air quality based on social media* 2017 CPGIS Annual Conference (Buffalo, NY, USA). Aug. 2017.

Posters

P1. Jia, N., Zhang, Z., Liu, J., Viña, A., Lan, X., Wang, R., Cai, Z., Li, Y., **Xiaokang Fu**, Hu, Q., Wu, W. & Song, Q. *AcmNet: A Dual-Branch Attention-Based Deep Learning Framework for Improving Large-Scale Crop Mapping Using Sparse Seasonal Satellite Imagery.* 2024 American Geophysical Union Conference (AGU24) (Washington, D.C, USA). Link. Dec. 2024.

P2. Zhou, Y. Z. J. W. M. J. H. & **Xiaokang Fu**. *Flood Extraction Using Spaceborne Ka-Band SAR Images*. 2024 American Geophysical Union Conference (AGU24) (Washington, D.C, USA). Link. Dec. 2024.

Teaching

Harvard

2024	Instructor and organizer, Workshop: KNIME Business Hub for Spatiotemporal Data Science (Link)
2023	Lecturer, The Summer Workshop on Spatiotemporal Data Science at Harvard (Link)
2023	Speaker, Seminar: Spatiotemporal Data Analysis With Codeless Visual Programming (Link)

Academic Service

Professional Memberships

2023-now	Communications Committee Member, University Consortium for Geographic Information Science (UCGIS)
2023–now	Member, American Association of Geographers (AAG)
2024	Member, the Institute of Electrical and Electronics Engineers (IEEE)

Journal Reviewer

2025	International Journal of Applied Earth Observation and Geoinformation, Ecological Indicators
2024	Land, Sustainability, International Journal of Applied Earth Observation and Geoinformation

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