

HYEONGMO KOO

Assistant Professor

The Department of Geoinformatics
College of Urban Science, University of Seoul

163 Seoulsiripdaero #15-516, Dongdaemun-Gu, Seoul, Korea 02504

TEL: 82-2-6490-2885

E-mail: hmokoo@uos.ac.kr

Website: <https://hymokoo.weebly.com>

EDUCATION

- Ph.D. 2018, Geospatial Information Sciences, School of Economic, Political and Policy Sciences, The University of Texas at Dallas. (Dissertation: Visualizing and Modeling Spatial Data Uncertainty) (<https://utd-ir.tdl.org/handle/10735.1/6593>).
- M.A. 2010, Department of Geography Education, Seoul National University, Seoul, Korea. (Thesis: Delineating Spatially Constrained Commuting Zones with an Improved Measurement for Functional Regionalization) (<http://s-space.snu.ac.kr/handle/10371/64545>).
- B.A. 2005, Department of Geography Education, Seoul National University, Seoul, Korea.

EMPLOYMENT

- 2021 - present, Assistant Professor, The Department of Geoinformatics, College of Urban Science, University of Seoul.
- 2020 - 2021, Research Associate, Korea Center for City and Environment Research, Seoul, Korea.
- 2018 - 2020, Postdoctoral Research Associate, the Key Laboratory of Virtual Geographic Environment, School of Geography, Nanjing Normal University, China.
- 2014 - 2018, Research and Teaching Assistant, School of Economic, Political and Policy Sciences, The University of Texas at Dallas.
- 2011 - 2012, Research Assistant, Statistical Research Institute, National Statistics Office, Daejeon, Korea.

RESEARCH INTERESTS

GIS, spatial statistics and machine learning, spatial data uncertainty, geovisualization, and issues related to urban geography including environment, housing, population migration, and crime.

RESEARCH GRANT

2022-2025, Developing machine learning methods incorporating spatial data properties, **Koo H.** (PI), National Research Foundation of Korea (NRF), 2022R1C1C1007360.

PUBLICATIONS

Journal Articles

- 2024, **Koo, Hyeongmo**, Musang You*, Hyunil Seo, and Sungjae Park, Exploring effectiveness of spatial features for incorporating spatial data into machine learning, *Journal of the Korean Society of Surveying, Geodesy, Photogrammetry and Cartography*, 42 (1), 1-13. (in Korean)
- 2023, Park, Sungjae, Hyunil Seo, **Hyeongmo Koo***, Exploring the spatio-temporal clusters of closed restaurants after the COVID-19 outbreak in Seoul using relative risk surfaces, *Scientific Reports*, 13(1), 13889.
- 2022, **Koo, Hyeongmo**, Soyoung Lee, Jiyeong Lee, and Daeheon Cho*, Spatio-temporal variability of the impact of population mobility on local business sales in response to COVID-19 in Seoul, Korea, *ISPRS International Journal of Geo-Information*, 11 (10), 532.
- 2021, Conover, Soojin, **Hyeongmo Koo**, and Renée Boynton-Jarrett*, Spatio-temporal trends in discarded needle reports near schools in Boston, Massachusetts between 2016-2019, *The American Journal of Drug and Alcohol Abuse*, 47 (6), 737-745.
- 2021, **Koo, Hyeongmo***, Yongwan Chun, and David W. S. Wong, Measuring local spatial autocorrelation with data reliability information, *The Professional Geographer*, 73 (3), 464-480.
- 2020, **Koo, Hyeongmo**, Takuya Iwanaga, Barry F. W. Croke, Anthony J. Jakeman, Jing Yang, Hsiao-Hsuan Wang, Xifu Sun, Guonian Lü, Xin Li, Tianxiang Yue, Wenping Yuan, Xintao Liu, and Min Chen*, Position paper: sensitivity analysis of spatially distributed environmental models: A pragmatic framework for the exploration of uncertainty sources, *Environmental Modelling and Software*, 134, 104857.
- 2020, Jiang, Hao, John van Genderen, Paolo Mazzetti, **Hyeongmo Koo**, and Min Chen*, Current status and future directions of geoportals, *International Journal of Digital Earth*, 13 (10), 1093-1114.
- 2020, **Koo, Hyeongmo**, and Jinhee Lee*, The inequality in education and its spatio-temporal changes, *The Journal of the Association of Korean Photo-Geographers*, 30 (3), 1-18. (in Korean)
- 2020, **Koo, Hyeongmo**, The spatio-temporal distribution of urban commercial structure in Seoul based on kernel weighted location quotients, *Journal of the Korean Urban Geographical Society*, 23 (2), 125-139. (in Korean)
- 2020, **Koo, Hyeongmo**, Min Chen*, Anthony J. Jakeman, and Fengyuan Zhang, A global sensitivity analysis approach for identifying critical sources of uncertainty in non-identifiable spatially distributed watershed models: a holistic analysis applied to SWAT for input datasets and model parameters, *Environmental Modelling and Software*, 127, 104676.
- 2020, **Koo, Hyeongmo**, Exploring the spatio-temporal distribution of commercial gentrification processes in Seoul: focus on the change in coffee shops densities, *Journal of the Korean Cartographic Association*, 20 (1), 117-129. (in Korean)

- 2020, **Koo, Hyeongmo**^{*}, Monghyeon Lee, Yongwan Chun, and Daniel A. Griffith, Space-time cluster detection with cross-space-time relative risk functions, *Cartography and Geographic Information Science*, 47 (1), 67-78.
- 2019, **Koo, Hyeongmo**, The spatio-temporal distribution and housing conditions of a Gosiwon in Seoul, *Journal of the Korean Cartographic Association*, 19 (2), 105–118. (in Korean)
- 2019, **Koo, Hyeongmo**, Exploring spatial heterogeneity in factors of housing prices in Seoul using Moran eigenvector spatial filtering based spatially varying coefficients, *Journal of the Association of Korean Geographers*, 8 (2), 321-335. (in Korean)
- 2019, **Koo, Hyeongmo**^{*}, David W. S. Wong, and Yongwan Chun, Measuring global spatial autocorrelation with data reliability information, *The Professional Geographer*, 71 (3), 551-565.
- 2018, **Koo, Hyeongmo**, Exploring spatial characteristics of college entrance and job migration, *Journal of the Korean Urban Geographical Society*, 21 (3), 109-122. (in Korean)
- 2018, **Koo, Hyeongmo**^{*}, Yongwan Chun, and Daniel A. Griffith, Integrating spatial data analysis functionalities in a GIS environment: Spatial Analysis using ArcGIS Engine and R (SAAR), *Transactions in GIS*, 22 (3), 721–736.
- 2018, **Koo, Hyeongmo**^{*}, Yongwan Chun, and Daniel A. Griffith, Modeling positional uncertainty acquired through street geocoding, *International Journal of Applied Geospatial Research*, 9 (4), 1–22.
- 2018, **Koo, Hyeongmo**, Yongwan Chun^{*}, and Daniel A. Griffith, Geovisualizing attribute uncertainty of interval and ratio variables: a framework and an implementation for vector data, *Journal of Visual Languages and Computing*, 44, 89–96.
- 2017, **Koo, Hyeongmo**, Yongwan Chun^{*}, and Daniel A. Griffith, Optimal map classification incorporating uncertainty information, *Annals of the American Association of Geographers*, 107 (3), 575–590.
- 2014, Shin, Jungyeop, Hakgi Sohn, and **Hyeongmo Koo**, Exploration of spatial relationship between urban regions and mountain geomorphology: review of theoretical examination and quantitative case analysis, *Journal of the Korean Cartographic Association*, 14 (1), 29–47. (in Korean)
- 2013, Cho, Daeheon, Sang-Il Lee, and **Hyeongmo Koo**, Producing multilingual world maps, *Journal of the Korean Cartographic Association*, 13 (1), 1–15. (in Korean)
- 2013, Lee, Sang-Il, Daeheon Cho, and **Hyeongmo Koo**, Developing a web-based multilingual geographical names service, *Journal of the Korean Cartographic Association*, 13 (1), 33–46. (in Korean)
- 2012, **Koo, Hyeongmo**, Improved hierarchical aggregation methods for functional regionalization in the Seoul metropolitan area, *Journal of the Korean Cartographic Association*, 12 (2), 25–35.

Proceedings, Book chapters, and Reports

- 2023, Kang, Youngok, **Hyeongmo Koo**, et al., *Understanding and Utilizing Geospatial Information*, Seoul, Korea: Purungil. (in Korean)
- 2022, **Koo, Hyeongmo** and Yongwan Chun, GIScience: Addressing aggregation and uncertainty, *The Routledge Handbook of Methodologies in Human Geography*. Eds. Rosenberg, M., Lovell, S., and Coen, S. London: Routledge.

- 2021, Choi, Eunyoung and **Hyeongmo Koo**, Exploring the relationship between housing policies and house sale prices, *KOSTAT Plus*, 13, 6-23. (in Korean)
- 2020, Choi, Eunyoung and **Hyeongmo Koo**, Related to the movie “Parasite”: The conditions of basement dwelling and its political implications, *Korea Research Institute for Human Settlements (KRIHS) Issue Report*, 15, 1-8. (in Korean)
- 2016, Chun, Yongwan, **Hyeongmo Koo**, and Daniel A. Griffith, A comparison of optimal map classification methods incorporating uncertainty information, in J-S Bailly, D. Griffith, and D. Josselin (eds.), *Proceedings of Spatial Accuracy 2016*. Avignon, FR: UMR 7300 ESPACE, 177–181.
- 2015, **Koo, Hyeongmo**, Yongwan Chun, and Daniel A. Griffith, Geovisualization of attribute uncertainty, *Proceedings of the 13th International Conference on Geocomputation*, 230–236.

PRESENTATIONS

Conference Presentations

- 2023, “Exploring the effectiveness of the spatial features to incorporate spatial data into machine learning,” The 2023 Spring Meeting of the GeoAI Data Society, Busan, Korea, June, 28 (Yoo, M., Park, S., Kang, H., and **Koo, H.**).
- 2023, “Improving classification accuracies of land characteristics using machine learning,” The 2023 Spring Meeting of the GeoAI Data Society, Busan, Korea, June, 28 (Seo, H., Jeong, M., and **Koo, H.**).
- 2022, “Machine learning methods incorporating spatial data properties,” The 2022 Fall Meeting of the Association of Korean Geographers, Seoul, Korea, December 3 (**Koo, H.**).
- 2022, “The effects of spatial autocorrelation on cross-validation and the validation of spatial cross-validation techniques,” The 2022 Fall Meeting of the GeoAI Data Society, Jeju, Korea, November, 17 (Yoo, M. and **Koo, H.**).
- 2022, “Incorporating spatial features into machine learning methods,” The 2022 Fall Meeting of the GeoAI Data Society, Jeju, Korea, November, 17 (Seo, H., Park, S., Yoo, M., and **Koo, H.**).
- 2022, “The effects of spatial autocorrelation on cross-validation and the validation of spatial cross-validation techniques,” The 2022 Spring Meeting of the GeoAI Data Society, Busan, Korea, June, 16 (Yoo, M. and **Koo, H.**).
- 2021, “Space-time cluster detection with cross-space-time relative risk functions,” The 2021 Spring Meeting of the Association of Korean Geographers, June 5 (online) (**Koo, H.**).
- 2020, “Exploring the changes in commercial gentrification processes using coffee shops densities,” The 2020 Winter Meeting of the Association of Korean Geographers, December 15 (online) (**Koo, H.**).
- 2019, “A global sensitivity analysis for spatially distributed watershed models: a holistic analysis applied to SWAT for input datasets and model parameters,” The 23rd International Congress on Modelling and Simulation, Canberra, Australia, December 6 (**Koo, H.**, Chen, M., Jakeman, A., and Zhang, F.).
- 2019, “Uncertainty and sensitivity analyses for integrated environmental models with a SWAT application,” The 1st Regional Conference on Environmental Modelling and Software, Nanjing, China, May 18 (**Koo, H.**, Chen, M., and Zhang, F.).

- 2018, “Integrating spatial data analysis functionalities in a GIS environment: Spatial Analysis with ArcGIS Engine and R (SAAR),” The 2018 ESRI International User Conference, San Francisco, CA, July 10 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2018, “Space-time cluster detection with cross-space-time relative risk functions,” The 114th Annual Meeting of the Association of American Geographers, New Orleans, LO, April 11 (**Koo, H.**, Lee, M., Chun, Y., and Griffith, D. A.).
- 2017, “Developing a spatial analysis package with ArcGIS Engine and R,” The 64th Annual North American Meetings of the Regional Science Association International, Vancouver, Canada, November 10 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2017, “Developing a spatial clustogram and co-clustogram as new visual analytics for exploratory spatial data analysis,” The 28th International Cartographic Conference of the International Cartographic Association, Washington, D.C., July 3 (Lee, S.-I., and **Koo, H.**).
- 2017, “Spatial Analysis using ArcGIS engine and R (SAAR),” The 113th Annual Meeting of the Association of American Geographers, Boston, MA, April 6 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2016, “Modeling positional uncertainty incurred through street geocoding,” The 63rd Annual North American Meetings of the Regional Science Association International, Minneapolis, MN, November 12 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2016, “Visualization of uncertainty in image classification with special reference to spatial autocorrelation,” The 2016 annual meeting of the Southwest Division of the Association of American Geographers, Denton, TX, October 21 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2016, “A comparison of optimal map classification methods incorporating uncertainty information,” The 12th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Montpellier, France, July 07 (Chun, Y., **Koo, H.**, and Griffith, D. A.).
- 2016, “Optimal map classification methods incorporating uncertainty information,” The 112th Annual Meeting of the Association of American Geographers, San Francisco, CA, March 30 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2015, “Geovisualization of attribute uncertainty,” The 13th International Conference on GeoComputation, Richardson, TX, May 22 (**Koo, H.**, Chun, Y., and Griffith, D. A.).
- 2015, “The classification method for defining an interval at multiple maps in spatio-temporal data,” The 111th Annual Meeting of the Association of American Geographers, Chicago, IL, April 22 (**Koo, H.**).
- 2014, “Space-time crime clusters: detection, visualization, and statistical testing using space-time kernel density estimation,” 61st Annual North American Meetings of the Regional Science Association International, Washington, D.C., November 13 (Lee, M., **Koo, H.**, and Chun, Y.).
- 2012, “An improved hierarchical aggregation method for functional region delineation,” The 2012 Winter Meeting of the Association of Korean Geographers, Seoul, Korea, December 15 (**Koo, H.**).

Invited Presentations

- 2024, “Spatial Machine Learning: incorporating spatial data properties into machine learning,” 13th New year

- Academic Conference, Korea Society for Geospatial Information Science, Jeju, Korea, February 16.
- 2021, “Spatial Data Uncertainty,” Department of Geography, Kyung Hee University, Online, July 2.
- 2021, “Moran eigenvector spatial filtering based spatially varying coefficients,” Department of Geography Education, Korea University, Online, June 11.
- 2021, “Spatial Data Uncertainty,” Department of Geography Education, Seoul National University, Online, April 21.
- 2019, “Uncertainty and sensitivity analyses for geographical analysis models,” School of Geography, Nanjing Normal University, Nanjing, Jiangsu, China, November 8.

TEACHING EXPERIENCES

University Teaching

The Department of Geoinformatics, College of Urban Science, University of Seoul.

- Digital Cartography
- Fundamentals of Geospatial Information Sciences
- Fundamentals of Spatial Analysis
- Advanced Spatial Data Analysis
- Machine Learning for Spatial Data
- Spatial Big Data Mining

School of Economic, Political and Policy Sciences, The University of Texas at Dallas.

- GISC 4326: Cartography and Geovisualization (Fall 2017)

Student Advising

Master supervision:

- 2024: Hyunil Seo, Sungjae Park

AWARDS AND SCHOLARSHIP

- Teaching Award, University of Seoul, 2021 and 2023
- Outstanding Student Award, ESRI Development Center at the University of Texas at Dallas, 2016 and 2017.
- Student Paper Award, Korea-America Association for Geospatial and Environmental Sciences, 2017.
- Ph.D. Research Small Grants, The Office of Graduate Studies, The University of Texas at Dallas, 2017 and 2018.
- Pioneer Student Research Grant, School of Economic, Political and Policy Sciences, The University of Texas at Dallas, 2014, 2016, and 2017.

SOFTWARE/CODE DEVELOPMENT

- Soil & Water Assessment Tool-Sensitivity Analysis (SWAT-SA), 2021, Min Chen et al., <https://swat.tamu.edu/media/116620/swat-sa-10.zip>
- Cross-Space-Time Relative Risk Functions (STRRF), 2019, Hyeongmo Koo, Monghyeon Lee, Yongwan Chun, and Daniel A. Griffith, <https://github.com/hyeongmokoo/crossSTRRF>
- The Spatial Bhattacharyya coefficient (SBC), a global Spatial autocorrelation measure with data reliability information, 2018, Hyeongmo Koo, David W. S. Wong, and Yongwan Chun, <https://github.com/hyeongmokoo/SBC>
- Spatial Analysis with ArcGIS engine and R (SAAR), 2018, Hyeongmo Koo, Yongwan Chun, and Daniel A. Griffith, <https://thesaar.github.io/>
- Optimal map classification incorporating uncertainty information, 2017, Hyeongmo Koo, Yongwan Chun, and Daniel A. Griffith, <https://github.com/hyeongmokoo/UncerClassification>
- Geovisualization of Attribute Uncertainty, 2015, Hyeongmo Koo, Yongwan Chun, and Daniel A. Griffith, <https://github.com/hyeongmokoo/UcernVis>, <https://hdl.handle.net/10735.1/5609>
- For further information, see this GitHub, <https://github.com/hyeongmokoo>

PROFESSIONAL SERVICE AND MEMBERSHIPS

University Service

- The Department Head, Department of Geoinformatics, College of Urban Science, University of Seoul: 2024-

Community Service

- Seoul address information committee, Seoul metropolitan government, 2022-2024.

Professional Memberships

- Association of American Geographers (AAG)
- Association of Korean Geographers
- GeoAI Data Society
- International Environmental Modelling & Software Society (iEMSs)
- Regional Science Association International (RSAI)
- The Association of Korean Photo-Geographers
- The Korean Cartographic Association (KCA)
- The Korean Geographical Society
- The Korean Society for Geospatial Information Science
- The Korean Society of Surveying, Geodesy, Photogrammetry and Cartography
- The Korean Urban Geographical Society

Journal Paper Referee

- Annals of GIS: 2021 (3)
- Environmental Modelling & Software: 2021 (2), 2024 (1)

- Epidemiology: 2021 (1)
- Frontiers in Sustainable Cities: 2022 (1)
- ISPRS International Journal of Geo-Information: 2023 (1)
- Papers in Regional Science: 2018 (1), 2019 (2)
- PeerJ: 2018 (1)
- The American Journal of Drug and Alcohol Abuse: 2021 (1)
- Transactions in GIS: 2018 (1), 2019 (1), 2021(1), 2023 (1)
- The Professional Geographer: 2020 (2), 2023 (1)
- The Geographical Journal of Korea: 2022 (1)
- The Korea Spatial Planning Review: 2021 (2), 2022 (1)
- Journal of the Association of Korean Geographers: 2019 (1), 2020 (2), 2021 (1), 2022 (2)
- Journal of the Economic Geographical Society of Korea: 2020 (1), 2021 (1), 2022 (1)
- Journal of The Korean Association of Regional Geographers: 2023 (1)
- Journal of the Korean Cartographic Association: 2019 (3), 2020 (1), 2021 (4), 2022 (3), 2023 (3)
- Journal of the Korean Geographical Society: 2022 (1), 2023 (2)
- Journal of the Korean Urban Geographical Society: 2020 (2), 2021 (3). 2023 (3)
- Journal of Korean Society for Geospatial Information Science: 2022 (2), 2023 (2)

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