Workshop | Spatial Data Analysis

DYNAMICS PhD program (HU Berlin & Hertie School), Berlin, September 15 – 17, 2021

Karsten Donnay
Department of Political Science
University of Zurich
donnay@ipz.uzh.ch

Course Description

This workshop introduces spatial data analysis and its applications in quantitative social science research and is intended for PhD researchers. The first part will cover some of the foundations of spatial data analysis including basic concepts and definitions but also common methodological challenges (e.g., MAUP, aggregation problems). The remainder of the workshop then focuses on practical challenges for using spatial data, including integration of different spatial data types, the proper handling of event data and their deduplication. And in the last part we cover a number of more recent techniques for quantitative inference in highly disaggregated spatial settings and discuss associated best practices. Many of the examples are drawn from research on sub-national dynamics of conflict where spatial data has been extensively used in recent years but they translate to any other comparable empirical setting. The first two days of the workshop consist each of a condensed lecture-style introduction followed by a practical session in R. The last day focuses on current topics and we will discuss a few select research designs brought by participants. This is an applied workshop and you are encouraged to bring your own projects using spatial data and tackle them as part of the workshop. If you are interested to bring your own research design for the final session, please contact the organizers. For those requiring credits from the workshop, there will be the option to hand in a small final assignment that will be graded on a pass/fail basis.

Overview of the Course

Wednesday, Sep. 15, 2021:

Session 1: 10:00 – 12:00
- Foundations of spatial data analysis
- *sp*, *raster*, *maptools*, *spacetime* etc. *(practical session in R)*

Session 2: 14:00 – 16:00
- Spatial data integration, areal assignment etc.
- *geomerge* (*practical session in R*)

Thursday, Sep. 16, 2021:

Session 3: 10:00 – 12:00
- Integration and deduplication of event data
- *meltt (practical session in R)*

Session 4: 14:00 – 16:00
- Statistical inference using spatial data
- *spdep*, *splm, mwa* etc. (*practical session in R*)

Friday, Sep. 17, 2021:

Session 5: 10:00 – 12:00
- Current topics and open challenges
- *Discussion of a few select research designs brought by participants*

Course Website

https://www.karstendonnay.net/teaching/fall2021/spatial/

Related Readings and Resources

Bivand, R. S., Pebesma, E., & Gómez-Rubio, V. (2013). *Applied Spatial Data Analysis with R.* New York, NY: Springer.

Braithwaite, A., & Johnson, S. D. (2012). Space-Time Modeling of Insurgency and Counterinsurgency in Iraq. *Journal of Quantitative Criminology*, *28*(1), 31–48.

Buhaug, H., Gleditsch, K. S., Holtermann, H., Ostby, G., & Tollefsen, A. F. (2011). It's the Local Economy, Stupid! Geographic Wealth Dispersion and Conflict Outbreak Location. *Journal of Conflict Resolution*, *55*(5), 814–840.

Donnay, K., Dunford, E. T., McGrath, E.C., Backer, D., & Cunningham, D. C. (2019). Integrating Conflict Event Data. *Journal of Conflict Resolution* 63(5): 1337-1364.

Gleditsch, K. S., & Weidmann, N. B. (2012). Richardson in the Information Age: Geographic Information Systems and Spatial Data in International Studies. *Annual Review of Political Science*, *15*, 461–481.

LeSage, J., & Pace, R. K. (2009). *Introduction to Spatial Econometrics*. Boca Raton, Fl: CRC Press.

Openshaw, S., & Taylor, P. J. (1979). A Million or so Correlated Coefficients: Three Experiments on the Modifiable Areal Unit Problem. In N. Wrigley (Ed.), *Statistical Applications in the Spatial Sciences*, 127–144. London: Pion.

Schutte, S. (2017). Violence and Civilian Loyalties: Evidence from Afghanistan. *Journal of Conflict Resolution*, 61(8), 1595-1625.

Schutte, S., & Donnay, K. (2014). Matched Wake Analysis: Finding Causal Relationships in Spatiotemporal Event Data. *Political Geography*, 41, 1–10.

Schutte, S., & Weidmann, N. B. (2011). Diffusion Patterns of Violence in Civil Wars. *Political Geography*, 30(3), 143–152.

Cho, W. K. T., & Gimpel, J. G. (2012). Geographic Information Systems and the Spatial Dimensions of American Politics. *Annual Review of Political Science*, *15*(1), 443–460.

Tollefsen, A. F., Strand, H., & Buhaug, H. (2012). PRIO-GRID: A Unified Spatial Data Structure. *Journal of Peace Research*, *49*(2), 363–374.

Weidmann, N. B., & Ward, M. D. (2010). Predicting Conflict in Space and Time. *Journal of Conflict Resolution*, *54*(6), 883–901.

Weidmann, N. B., & Schutte, S. (2017). Using Night Light Emissions for the Prediction of Local Wealth. *Journal of Peace Research*, *54*(2), 125–140.

Zammit-Mangion, A., Dewar, M., Kadirkamanathan, V., & Sanguinetti, G. (2012). Point Process Modelling of the Afghan War Diary. *Proceedings of the National Academy of Sciences*, *109*(31), 12414–12419.

Zhukov, Y. (2012). Roads and the Diffusion of Insurgent Violence: The Logistics of Conflict in Russia's North Caucasus. *Political Geography*, 31(3), 144–156.