Workshop | Spatial Data Analysis

European University Institute, Florence, May 27 – 29, 2019

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Course Description

This workshop introduces spatial data analysis and its applications in quantitative social science research and is intended for PhD researchers and postdocs. 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. Each of the sections of the workshop consists of a condensed lecture-style introduction followed by a practical session in *R*. 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. 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

Monday, May 27, 2019:

Session 1: 11:00 – 13:00
- Foundations of spatial data analysis
- *sp*, *raster*, *maptools*, *spacetime* etc. *(practical session in R)*

Session 2: 15:00 – 17:00
- Spatial data integration, areal assignment etc.
- *geomerge* (*practical session in R*)

Tuesday, May 28, 2019:

Session 3: 11:00 – 13:00
- Integration and deduplication of event data
- *meltt (practical session in R)*

Session 4: 15:00 – 17:00
- Statistical modeling of spatial data
- *spdep*, *splm* etc. (*practical session in R*)

Wednesday, May 29, 2019:

Session 5: 11:00 – 13:00
- Current best practices (and their limitations)
- Causal inference using *mwa (practical session in R)*

Related Readings and Resources

Bhavnani, R., Donnay, K., Miodownik, D., Mor, M., & Helbing, D. (2014). Group Segregation and Urban Violence. *American Journal of Political Science*, 58(1), 226-245.

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. (2018). Integrating Conflict Event Data. *Journal of Conflict Resolution* doi: 10.1177/0022002718777050.

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., & Salehyan, I. (2013). Violence and Ethnic Segregation: A Computational Model Applied to Baghdad. *International Studies Quarterly*, *57*(1), 52–64.

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.