

Spatio-temporal statistics (MATH4341)

Michaelmas term

Georgios P. Karagiannis

georgios.karagiannis@durham.ac.uk

Department of Mathematical Sciences (Office MCS3088)

Durham University

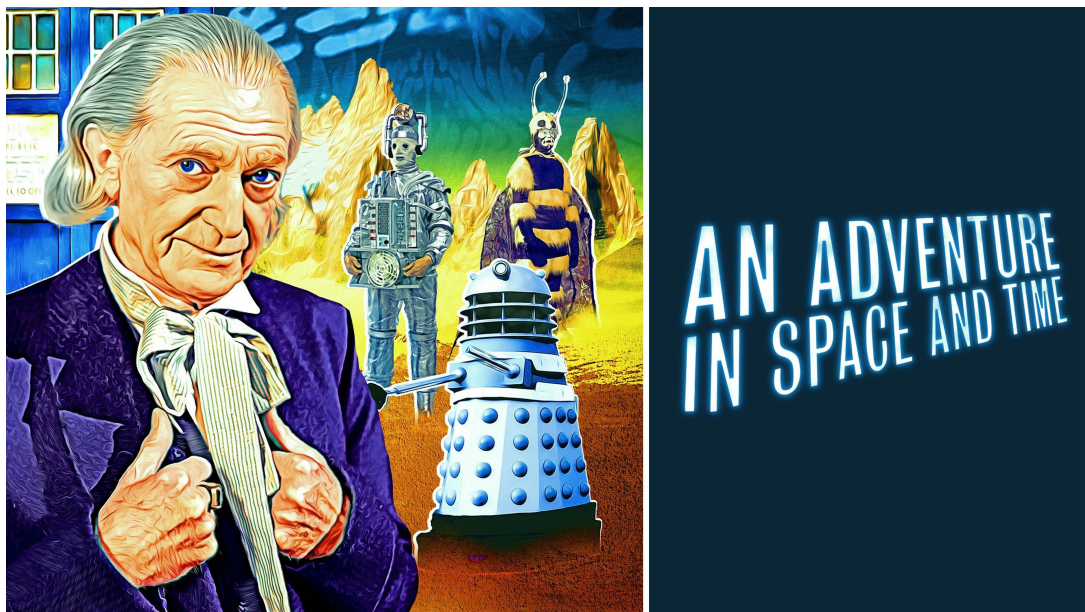
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Concepts

An introduction to spatial statistics:

- Regionalised statistical concepts
- Point pattern data analysis
- Aerial unit data analysis
- Computational statistics (INLA)
- Point referenced data analysis
- Implementation in R



Reading list

These lecture Handouts have been derived based on the above reading list.

Main texts:

- Cressie, N. (2015). Statistics for spatial data. John Wiley & Sons.
 - It will be our main reference book throughout the course. Classic book in spatial statistics, and a bit outdated.
- Wackernagel, H. (2003). Multivariate geostatistics: an introduction with applications. Springer Science & Business Media.
 - This is an awesome textbook for point referenced data, i.e. geostatistics. We will use this book for the concept point referenced data.
- Gaetan, C., & Guyon, X. (2010). Spatial statistics and modeling (Vol. 90). New York: Springer.
 - Similar to Cressie, N. (2015) but a bit more theoretical.
- van Lieshout, M. N. M. (2019). Theory of spatial statistics: a concise introduction. CRC Press.

Supplementary textbooks:

- Ripley, B. D. (2005). Spatial statistics. John Wiley & Sons.
 - Classic book in spatial statistics. Perhaps one of the first if not the first, outdated. It shows a good intuition into the concepts.
- Banerjee, S., Carlin, B. P., & Gelfand, A. E. (2014). Hierarchical modeling and analysis for spatial data. CRC press.
 - It requires some knowledge from multivariate statistics. It is mostly Bayesian.
- Schabenberger, O., & Gotway, C. A. (2005). Statistical methods for spatial data analysis. CRC press.
 - I have not checked it yet...
- Wikle, C. K., Zammit-Mangion, A., & Cressie, N. (2019). Spatio-temporal statistics with R. CRC Press.
 - It demonstrates how to implement spatial, and spatio-temporal concepts in R by using descent R/CRAN packages mainly developed by the authors.

- Diggle, P. J. (2013). Statistical analysis of spatial and spatio-temporal point patterns. CRC press.
 - Major focus on [S5] –Notice that this concept may not be introduced due to the time
- Blangiardo, M., & Cameletti, M. (2015). Spatial and spatio-temporal Bayesian models with R-INLA. John Wiley & Sons.
 - It demonstrate how to implement Integrated Nested Laplace Approximation methods.
- Gómez-Rubio, V. (2020). Bayesian inference with INLA. CRC Press.
 - It demonstrate how to implement Integrated Nested Laplace Approximation methods.