Spatio-temporal statistics (MATH4341)

Michaelmas term

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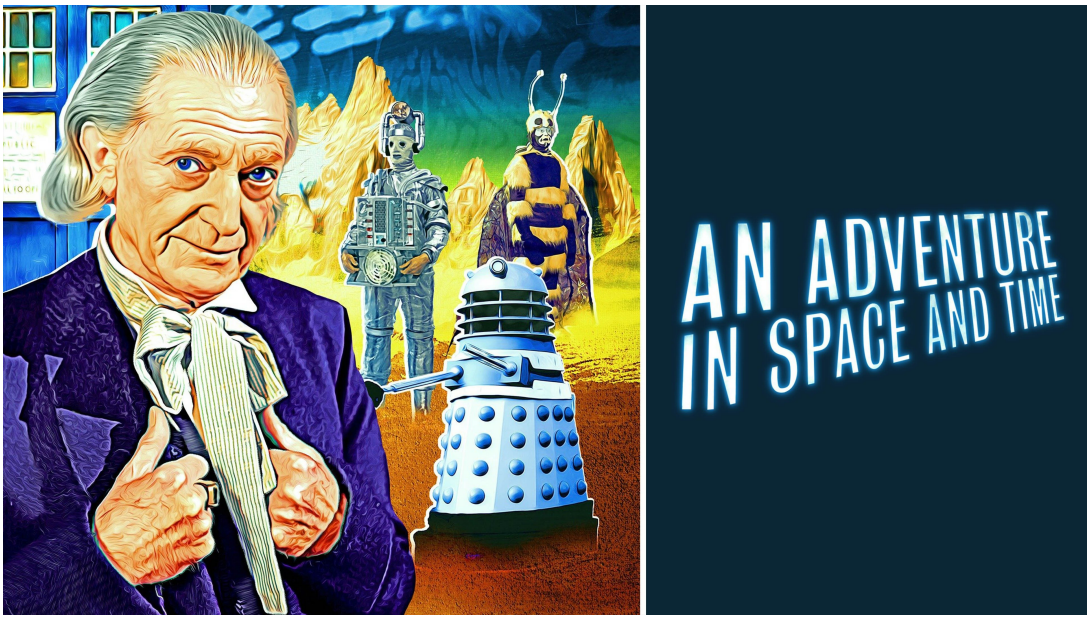
Concepts

- Reginalised statisticalconcepts
- Geostatistics & Kriging
- Aerial unit data analysis
- Point pattern data analysis
- Computational statistics (INLA)
- Implementation in R



Reading list

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

Main texts:

- Gaetan, C., & Guyon, X. (2010). Spatial statistics and modeling (Vol. 90). New York: Springer.
- van Lieshout, M. N. M. (2019). Theory of spatial statistics: a concise introduction. CRC Press.
- Wackernagel, H. (2003). Multivariate geostatistics: an introduction with applications. Springer Science & Business Media.
- Ripley, B. D. (2005). Spatial statistics. John Wiley & Sons.
- Banerjee, S., Carlin, B. P., & Gelfand, A. E. (2014). Hierarchical modeling and analysis for spatial data. CRC press.

Supplementary textbooks:

- Schabenberger, O., & Gotway, C. A. (2005). Statistical methods for spatial data analysis. CRC press.
- Wikle, C. K., Zammit-Mangion, A., & Cressie, N. (2019). Spatio-temporal statistics with R. CRC Press.
  - It demonstrate 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
- Cressie, N. (2015). Statistics for spatial data. John Wiley & Sons.
  - Classic book in spatial statistics, and a bit outdated. It requires some good knowledge of spatial statistics and it required probability theory.
- Gómez-Rubio, V. (2020). Bayesian inference with INLA. CRC Press.
  - It demonstrate how to implement Integrated Nested Laplace Approximation methods.

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Handout 1: Regional statistical concepts

Lecturer & author: Georgios P. Karagiannis georgios.karagiannis@durham.ac.uk

Aim. To introduce regional statistical concepts: random field, variogram,

Reading list & references:

- Wackernagel, H. (2003). Multivariate geostatistics: an introduction with applications. Springer Science & Business Media.
  - Ch. 1

Further reading

- van Lieshout, M. N. M. (2019). Theory of spatial statistics: a concise introduction. CRC Press.
- Banerjee, S., Carlin, B. P., & Gelfand, A. E. (2014). Hierarchical modeling and analysis for spatial data. CRC press.

1. Type of problems addressed

Note 1. kk