

WORKSHOP ON SPATIO TEMPORAL MODELLING PRELIMINARY PROGRAMME PAMPLONA, JUNE 25, 26 and 27, 2024

June 25, Tuesday	
9:15	Welcome and opening session
9:30-11:30	Course on Geostatistics: An introduction to Bayesian spatial regression
Coffee Break	
12:00-14:00	Course on Geostatistics
Lunch time	
15:30-17:30	Course on Geostatistics
Break	
18:00-19:00	Student Presentations: Session 1

June 26, Wednesday	
9:30-11:30	Course on Geostatistics
Coffee Break	
12:00-14:00	Course on Geostatistics
Lunch time	
15:30-17:30	Course on Geostatistics
Break	
18:00-19:00	Student Presentations: Session 2

June 27, Thursday	
9:00-12:00	Course on Geostatistics
Coffee Break	
12:30-14:00	Seminar on Point Processes: Statistical models for the analysis, prediction and monitoring of space-time data. Applications to infectious diseases and crime
Lunch time	
15:30-18:30	Workshop on Areal Data: Bayesian scalable models to analyze high-dimensional areal data using the <code>bigDM</code> library
18:30	Closing session

To enroll in the workshop, please fill out the following form.
Deadline: May 17, 2024

<https://forms.gle/jTj2wuzKAVwNeZLE9>

PROGRAMME DETAILS

COURSE ON GEOSTATISTICS

Title: An introduction to Bayesian spatial regression

Lecturer: Alexandra M. Schmidt, McGill University, Montreal (Canada)

<http://alex-schmidt.research.mcgill.ca/>

Abstract: This course aims at giving an introduction to spatial modelling of point referenced data under the Bayesian paradigm. Topics that will be discussed include Gaussian processes; Stationarity and Isotropy; Geometric anisotropy; Variogram; Correlation Functions; Bayesian kriging; Bayesian kriging in non-normal models. The last part of the course will point out some current topics of research in the area, including large spatial data and spatio-temporal models. All the theory presented will be followed by examples with real data analysis using packages (e.g., Nimble and Stan) in R.

WORKSHOP ON AREAL DATA

Title: Bayesian scalable models to analyze high-dimensional areal data using the `bigDM` library

Lecturer: Aritz Adin, Public University of Navarre, Pamplona (Spain)

<https://github.com/aritz-adin>

Abstract: Several statistical models and computational methods have emerged in the disease mapping literature, aiming to derive smoothed risk (or rates) estimates for areal data by integrating spatial and/or spatio-temporal dependence structures. However, the development of scalable models for the analysis of high-dimensional count data remains limited. The R package `bigDM` addresses this gap by implementing a range of univariate and multivariate scalable Bayesian models, using a "divide-and-conquer" approach. It relies on the well-known INLA (integrated nested Laplace approximation) technique for approximate Bayesian inference in latent Gaussian models.

SEMINAR ON POINT PROCESSES

Title: Statistical models for the analysis, prediction and monitoring of space-time data.

Applications to infectious diseases and crime

Lecturer: Jorge Mateu, University Jaume I of Castellon, Castellon (Spain)

<https://www3.uji.es/~mateu/>

Abstract: The talk introduces statistical approaches for understanding the temporal and spatial dynamics of infectious diseases, particularly focusing on Covid-19. It details a non-stationary spatio-temporal point process, using a neural network-based kernel to capture spatial triggering effects. Exogenous influences from city landmarks are considered, and mechanistic models provide data-driven forms for spatio-temporal intensity functions. Cluster models for identifying unknown parents are proposed, and a method to evaluate spread direction and velocities is presented using a growth differential equation.

Crime science analyzes diverse crime data, using statistical models to detect crime generators, identify factors attracting/inhibiting crimes in a spatio-temporal region. Methods address data dimensionality, employing AI. Two key probabilistic models involve log-Gaussian Cox processes for forecasting crime risk in city subregions and stochastic models with differential equations governing crime spread