Introduction to the analysis of spatial data using R

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Who?

- Ana I Moreno Monroy
- Research fields: development, urban, labor and transport economics, economic geography
- Current research interests: income segregation, urban spatial structure, informality, firm location
- User of Stata, ArcGIS, QGIS, (a bit of) Matlab, Latex and R

Course Aim

The aim of this course is to introduce basic tools for the analysis of spatial data using the open source programming language R. At the end of the course, you will be able to download and import data files and spatial files into R, handle and manipulate spatial objects, visualize spatial data, create (interactive) maps, download, handle and plot data from Open Street Maps and geolocate data using the geolocating services from Google's API through R.

Course methodology

- 16 hours, 4 x day
- Introduction to basic concepts, practical examples
- Demos
- Individual and team practical excersises (practise makes the master)

Prerequisites

The course does not require previous knowledge of R, but basic knowledge of other statistical or programming languages is desirable (e.g. Matlab, Stata). Advanced statistical/econometrics knowledge is required to make the most of the computing possibilities offered by R.

The software required (R and R Studio) is freely available online.

Course contents

Chapter 1: Introduction to R and R Studio

- The **R**evolution
- R and R Studio
- Getting familiar with R studio
- Basic inspection and statistics
- Subsetting, selecting and creating variables
- Downloading, unzipping and saving files

Chapter 2: Spatial data

- Spatial data: definition and types
- Spatial objects and projections
- Merging statistical information into spatial objects
- Additional operations with polygons

Chapter 3: Point data

- Georeferenced point data: an example
- From points to Spatial Points
- Plots and additional operations with spatial points
- Merging point data and spatial polygons
- (Interactive) mapping with ggplot2, leaflet and shiny

Chapter 4: Geolocation. Using OSM data

- Geolocation and commuting distances using ggmap and Google's API
- Geolocating a large number of addresses
- Verifying, visualizing and exporting the output
- Open Street Map Spatial Data: Basic usage

Bibliography

- Kahle, David, and Hadley Wickham. "ggmap: Spatial Visualization with ggplot2." R Journal 5.1 (2013).
- Torfs, Paul, and Claudia Brauer. "A (very) short introduction to R." Hydrology and Quantitative Water Management Group, Wageningen University, The Netherlands (2014).
- Venables, W. N., and D. M. Smith. "the R Core Team." An Introduction to R. Notes on R: A Programming Environment for Data Analysis and Graphics. URL: ran. r-project. org/doc/manuals/r-release/R-intro. pdf (2015).