ENVS3/563 - Module Handbook

Dani Arribas-Bel

Contents

ENVS363/563

Geographic Data Science

Welcome to Geographic Data Science, a course taught by Dr. Dani Arribas-Bel in the Autumn of 2015 at the University of Liverpool.

The timetable for the course is:

- **Lectures**: Thursdays - 12:30/13:30, `MATH-029`.
- **Computer Labs**: Thursdays - 15:00/17:00, `CTL-6-PCTC-Blue` (with the exception of Week 3, Thursday Oct. 15th, which is at `GUILD-SUTC` and `ELEC-304`).

Locations

- `MATH-029`: Mathematics Building, Room 029, Building Ref: 206 Grid. Ref: E6 on the campus map.
- `CTL-6-PCTC-Blue`: Central Teaching Laboratory, PC Centre, Blue Zone. Building Ref: F6 on campus map.

- `GUILD-SUTC`: Guild of Students, Pc Centre. Building Ref: 406. Grid Ref: D4 on campus map.
- `ELEC-304`: Electrical Engineering, Room 304. Building Ref: 235. Grid Ref: E7 on the campus map.

Contact

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Overview

Aims

The module provides students with core competences in Geographic Data Science (GDS). This includes the following:

- Advancing their statistical and numerical literacy.
- Introducing basic principles of programming and state-of-the-art computational tools for GDS.
- Presenting a comprehensive overview of the main methodologies available to the Geographic Data Scientist, as well as their intuition as to how and when they can be applied.
- Focusing on real world applications of these techniques in a geographical and applied context.

Learning outcomes

By the end of the course, students will be able to:

- Demonstrate advanced GIS/GDS concepts and be able to use the tools programmatically to import, manipulate and analyse data in different formats.
- Understand the motivation and inner workings of the main methodological approcahes of GDS, both analytical and visual.
- Critically evaluate the suitability of a specific technique, what it can offer and how it can help answer questions of interest.
- Apply a number of spatial analysis techniques and how to interpret the results, in the process of turning data into information.
- When faced with a new data-set, work independently using GIS/GDS tools programmatically.

Feedback strategy

The student will receive feedback through the following channels:

- Formal assessment of the two summative assignments. This will be on the form of reasoning of the mark assigned as well as comments specifying how the mark could be improved. This will be provided no later than three working weeks after the deadline of the assignment submission.
- Direct interaction with Module Leader and demonstrators in the computer labs. This will take place in each of the scheduled lab sessions of the course.

Key texts and learning resources

Access to materials, from lecture slides to lab notebooks, is centralized through the use of a course website available in the following url: `https://darribas.org`

Specific readings, videos, and/or podcasts, as well as academic references will be provided for each lecture and lab and can be accessed through the course website.

Syllabus

Week 1: Introduction

- Lecture: Geographic Data Science.
- Tutorial: (Geo-)Data Science tools.

Week 2: Spatial Data

- Before class
    - Add link here
- Lecture: Geo-Data.
- Tutorial: Tidy Data.

Week 3: (Geo)Visualization

- Before class
    - Add link here
- Lecture: (Geo)Visualization.
- Tutorial: John Snow's cholera map.

Week 4: Choropleth mapping

- Before class

    - Add link here

- Lecture: Choropleth mapping.
- Tutorial: Mapping deprivation.

Week 5: Spatial Weights

- Before class

    - Add link here

- Lecture: Spatial Weights.
- Tutorial: Spatial Weights.

Week 6: ESDA

- Before class

    - Add link here

- Lecture: Exploratory Spatial Data Analysis (ESDA).
- Tutorial: Clustering and clusters in XIXth. century London.

Week 7: No class

This week there will not be a lecture or a computer lab.

Week 8: Clustering

- Before class

    - Add link here

- Lecture: Clustering.
- Tutorial: Geodemographic analysis.

Week 9: Point Data

- Before class

    - Add link here

- Lecture: Point Data.
- Tutorial: Exploring Twitter patterns.

Week 10: Spatial interaction models

- Before class

    - Add link here

- Lecture: Spatial interaction models.
- Tutorial: *Where do I put my coffee shop?*.

Week 11: Spatial regression

- Before class

    - Add link here

- Lecture: Spatial regression.
- Tutorial: Spatial regression.

Week 12: (Spatial) causal inference

- Before class

    - Add link here

- Lecture: Spatial causal inference.
- Tutorial: Team work on projects.