ABSTRACT

This course provides an introduction into core concepts and applications of data science based approaches to geospatial data analysis.

DESCRIPTION

Geospatial data is ubiquitous. Massive geospatial data are generated every second from our smartphones, through our social media posts, or through many kinds of other means like tracked whale trajectories in the ocean, allowing us to trace the movements of entire societies. As these data keep growing, it becomes more important to extract meaningful insights from location, relation, and position, for applications as diverse as business analytics, epidemiology, or species protection.

This course provides students core competences in Geospatial Data Science (GDS). This includes the following:

* Data structures and principles of GIS; map projections and measurement
* Gathering and preprocessing large-scale geospatial data
* State-of-the-art computational tools for GDS
* Spatial network analysis
* Main methodologies available to the Geospatial Data Scientist, as well as their intuition as to how and when they can be applied
* Real world applications of these techniques in an applied context

FORMAL PREREQUISITES

A prerequisite for taking this course is solid know-how in Python programming and data analysis.

INTENDED LEARNING OUTCOMES

After the course, the student should be able to:

* Demonstrate GIS/GDS concepts and be able to use relevant Python libraries programmatically to import, manipulate and analyze spatial data in different formats. Apply a number of spatial analysis techniques and explain how to interpret the results, in a process of turning data into insights.
* Reflect on the motivation and inner workings of the main methodological approaches of GDS, both analytical and visual.
* Critically evaluate the suitability of a specific GDS technique, what it can offer and how it can help answer questions of interest.
* Apply a number of spatial analysis techniques and explain how to interpret the results, in a process of turning data into insights.
* When faced with a new data-set, work independently using GIS/GDS tools programmatically to extract valuable insight.

LEARNING ACTIVITIES

There are 14 weeks of learning/teaching activities.

The lectures cover topics in Geospatial Data Science as listed in the course content. These lectures will involve demonstrations of and experiments with Python libraries programmatically to import, manipulate and analyze spatial data in different formats, and the application of spatial analysis techniques. The suitability of geospatial data science techniques will be reflected and evaluated critically via case-based and problem based learning processes.

The exercise sessions are practical hands-on sessions associated with the topics covered in the weekly lectures. These exercises will be more applied and interactive than the lectures, with individual and group work, buzz groups, and exercises with feedback.

COURSE LITERATURE

No single book covers the entire syllabus of the course, as such the course will use excerpts from multiple books & articles. Therefore you will not need to buy a course book.

Mandatory literature for the examination: All reading and learning materials that are provided through learnit for all lectures of the course.

STUDENT ACTIVITY BUDGET

Estimated distribution of learning activities for the typical student

* Preparation for lectures and exercises: 5%
* Lectures: 15%
* Exercises: 15%
* Exam with preparation: 65%

ORDINARY EXAM

**Exam type:**  
C: Submission of written work, Internal (7-point scale)  
**Exam variation:**  
C1G: Submission of written work for groups

**Exam submisson description:**  
The submission is a written project report about the application of geospatial data science to answer a research question or to create a prototype of a digital product. It may range from a technical workflow proof of concept to research data exploration. The project should solve a problem with a geospatial dimension and may focus on any aspect of spatial data collection, visualization, analysis, or statistical evaluation. The submission has two parts: (a) commented code deposited on Github (or similar code repository) and (b) the associated report that describes the project and links to the code repository.  
To document individual contributions to the shared submission, students submit a disclosure statement stating the different focuses and/or workloads among group members.

**Group submission:**  
Group

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