Center for Regional Economic Development (CRED)
Spatial methods for economists using Python
2 – 6 September 2024

Course Goals and content

In the last decade, the use of spatial data in empirical analyses has spread to a variety of economic fields, including urban and real estate economics, development and environmental economics, labor and public economics, economic history, and trade. The aim of the course is to provide students and researchers with an effective and systematic workflow allowing them to extract and structure information provided by spatial data. To this end, the course will primarily focus on the automation of tasks involving spatial data using Python and ArcGIS. Among others, these tasks include importing different formats of spatial data, projecting spatial data to a common reference system, defining a spatial structure, selecting areas according to specific rules, merging data according to their spatial relationship, computing spatial statistics, and exporting the results. Additionally, the course will show how to integrate these tasks into the workflow of standard statistical software, such as R and Stata. The programming part of the lecture is complemented with a discussion of papers published in leading economic journals that exploit spatial data in their econometric analyses.

Lecturer

Olivier Schöni is Associate Professor at the Swiss Graduate School of Public Administration (IDHEAP) at the University of Lausanne. Prior to his current role, he was Assistant Professor at Laval University in the Department of Finance, Insurance, and Real Estate, and has held positions as Research Officer at the London School of Economics. His academic journey is characterized by a blend of quantitative academic research and practical insights into urban economics, real estate, and policy evaluation. His scholarly work includes publications in academic journals such as the Journal of Urban Economics and Journal of Housing Economics, and his research has been cited in prominent media outlets like The Economist.
Email : olivier.schoeni@unibe.ch

Course Content

A   Introduction to spatial data (Monday morning)

1. Motivation and goals of the course
2. Why use Python and ArcGIS?
3. Types of spatial data, projections, where to obtain spatial data
4. Working with ArcGIS Pro

B   Introduction to Python and arcpy (Monday afternoon)

1. Python IDEs and setting up a project
2. Structure of a python script
3. A crash course in Python
4. Basics of SQL for data selection
5. Exercises

C   Vector data (Tuesday morning)

1. Where to find information
2. Arcpy tools for vector data
3. Exercises

D   Raster data (Wednesday morning)

1. Arcpy tools for raster data
2. Focus on elevation data
3. Conversion tools
4. Exercises

E   Advanced Python programming and integrating Python into Stata and R (Thursday morning)

1. Debugging, coding tips and tricks, improving execution time
2. Importing and preparing spatial data in Stata and R
3. Running python scripts from Stata and R
4. Overview of packages for handling spatial data in Stata and R
5. Exercises

F   Identification strategies using spatial data – Part 1 (Thursday morning)

1. Using spatial data in econometrics
2. Using spatial data as dependent variable, variable of interest, and/or controls.
3. Level of spatial aggregation and of clustering standard errors
4. Discussion of papers

G   Identification strategies using spatial data – Part 2 (Friday morning)

1. Discussion on spatial data and endogeneity issues
2. Using spatial data to derive instruments
3. Using spatial data to implement boundary discontinuity designs
4. Discussion of papers

Grading

The grade will be determined by a group project in which students have to replicate and present the spatial analysis carried out in an academic paper and/or to carry out a series of tasks proposed by the teacher. Each group will present its project. The final grade will be a weighted average of the grades of the project content (code and presentation document) and of the oral presentation.

Organization

The course is intended for PhD students, young postdoc researchers and advanced master students in economics or a closely related field.

Lecture hours: 32.5   ECTS: 6

Timetable and Registration

The course takes place from Monday to Friday from 9.00 to 12.15 and from 13.30 to 16.45 (Tuesday to Friday afternoon is to work on the project assignments)

Venue: University of Bern.

Lecture notes, data, and code are made available prior to the lecture and can be downloaded from an online platform of the University of Bern (ILIAS).

PhD students not enrolled at the University of Bern should send their application to: phd.applications@wti.org

Deadline for applications: August 2nd, 2024.