Geospatial Data Science: GeoPandas

IT & IT Engineering
Rome (Italy)
17 - 21 Feb 2025

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Geospatial Data Science: GeoPandas

Ref: 321567_127846 **Date:** 17 - 21 Feb 2025 **Location:** Rome (Italy) **Fees:** 4200 **Euro**

Introduction

Learn why the Geospatial Data Science tools are becoming so popular in the Geospatial sector. The combination of Jupyter Notebooks with Python and GeoPanda's allows you to analyze vector data quickly, repeatably, and with full documentation of every step along the way so your entire analysis can be repeated at the touch of a button in a notebook format that can be shared with colleagues.

If you ever get asked to explain your analysis, either for a scientific paper, to defend your results in a court, or simply to share what you've done with others so they can follow your steps than you will be glad that you conducted your analysis in Jupyter notebooks with GeoPanda's rather than in a traditional desktop GIS system.

If you ever get frustrated with limitations in desktop GIS software, some of which is still 32 bit, single core software that uses decades old technology under the hood then you will appreciate the performance that can be achieved with this approach.

Course Objectives of Geospatial Data Science: GeoPandas

- How to analyze geospatial data using the python data science ecosystem
- Using Jupyter notebooks to provide complete documentation of your workflow and interactive code examples
- The basics of the python data science ecosystem: NumPy, Matplotlib, Pandas, etc.
- Geospatial extensions to the Python data science ecosystem: Fiona, Shapely, GDAL, and most importantly GeoPandas
- Perform common vector analysis tasks with GeoPandas

Geospatial Data Science: GeoPandas Course Outlines

Day 1
Introduction

- Differences between data science and GIS
- Advantages of the data science approach
- The python data science ecosystem for non-spatial data
- The python data science ecosystem for spatial data
- Introduction to Jupyter notebooks

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Day 2
Getting Started with GeoPandas

- Reading data into GeoPandas - Shapefiles
- Reading data into GeoPandas - other file types
- Reading data into GeoPandas - from PostGIS
- Advanced techniques for reading data into GeoPandas
- Reading non-spatial tabular data
- Reading data from an HTML table on the web
- Writing a GeoDataFrame to disk file or database
- Dataframes 101 - Part 1
- Dataframes 101 - Part 2
- Dataframes 101 - Part 3
- Dataframes 101 - Part 4

Day 3
Spatial Functions in GeoPandas & Other GIS Operation

- Measurements
- Functions that create geometry
- The GeoPandas apply function
- The Geopandas map and replace functions
- Low level Intersection functions
- The overlay function
- More spatial functions for the toolkit
- Dissolving geometries
- Clipping geometries
- Renaming columns
- Advanced geometry calculations
- The GeoPandas collect method
- Exploratory data analysis

Day 4
Python for GIS Applications

- What is a package
- Working with third party packages
- Python virtual environments - Part 1
- Python virtual environments - Part 2
- Intro to Jupyter noteboks
- Intro to NumPy
- Intro to Matplotlib
- Intro to Pandas
- Intro to GDAL and OGR0
- Intro to Fiona and Shapely

Day 5
Combining Data From Multiple Dataframes

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- Appending dataframes Concatenation
- Attribute joins GeoPandas merge
- Spatial joins

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