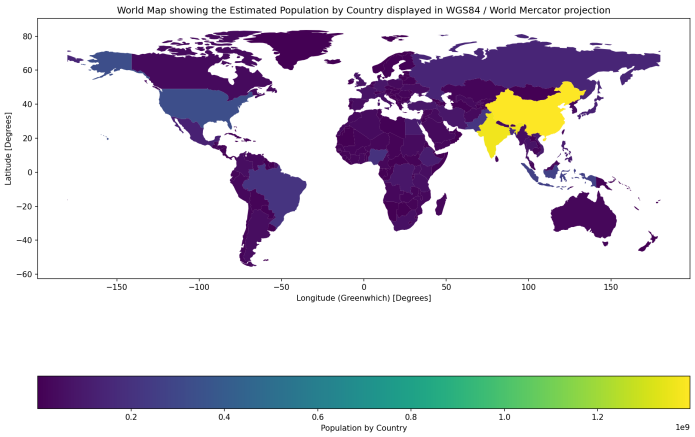
Geographical Data

1 Introduction



GeoPandas

Today, we'll work with open source geographical data from naturalearthdata.com alongside GeoPandas, an open source project used to make working with geospatial data in python easier. It **extends the datatypes used by pandas** to allow spatial operations on geometric types.

Data Structures

Similarly to pandas, GeoPandas provides two data structures for working with geographic data:

- `GeoSeries:` A vector where each entry in the vector is a set of shapes corresponding to one observation. An entry may consist of only one shape (like a single polygon) or multiple shapes that are meant to be thought of as one observation (like the many polygons that make up the State of Hawaii or a country like Indonesia). Typical entries include **Points or Multi-Points**, **Lines or Multi-Lines** and **Polygons or Multi-Polygons**
- `GeoDataFrame:` A tabular data structure that contains one `GeoSeries` column that holds geospatial information. This `GeoSeries` is referred to as the "Geometry" of a `GeoDataFrame`. When a spatial method is applied to a `GeoDataFrame` (or a spatial attribute like `area` is called, these commands will act on the "Geometry" column.

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2 Getting Started

To get started, your lecturer will show you how to **load and analyze** geographical data using GeoPandas, apply **transformations** to its coordinates, **create Choropleth Maps** using additional data (e.g. population estimations for countries) and **how to overlay multiple maps** to combine information in one figure.

3 Lab Assignments

As always, you are asked to finish the three assignments below until the next session.

Plot a Choropleth map focusing on a single continent ✓

Apply what you learned about how to create your own Choropleth maps by selecting a continent (not Antarctica, please ;-)) and plotting the percentage of the population using the Internet for each country displayed. Since this dataset includes historical data, you need to select a specific year of your interest as well before being able to plot the data on a map!

Plot the Internet usage of a single country over time ✓

Next make use of the historical data provided in the dataset linked above and single out a specific country. Visualize how the Internet usage over time changed for its population!

Create one additional Choropleth Map of your choosing ✓

Find some other information to overlay on a map of a country, continent or other part of the world. The easiest way to achieve this is by finding open source data that is geocoded in some way (e.g. with ISO country codes) and joining it onto the dataframes available from naturalearthdata.com containing geographic data. One possible source of such data is data.worldbank.org.

4 Homework

At the beginning of the next lab session, you will get a chance to indicate which of the **lab assignments** (✓) you completed and some of you will be asked to present their solution in class. Each student will be asked to present their solutions **at least twice** over the course of the semester. Other than that, no additional upload is needed. Please see the Course Syllabus for details on how this marking of assignments and their presentation affects your grade.

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