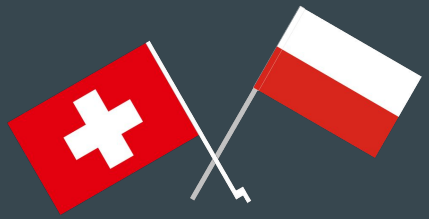
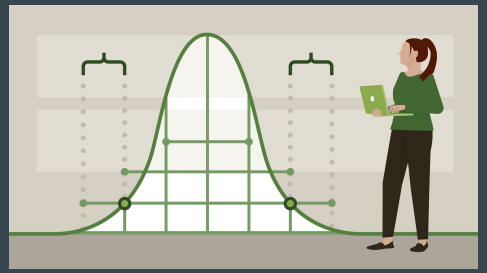
Python for Geographic Information System

Magdalena Surówka
Zazuko

About me



Born and raised in Poland
Living in Switzerland



Hands on experience in geospatial analytics
Working as Data Scientist
Studied Econometrics

Focus on Linked Data
...also Geodata
Solving graph problems

About you

- Your background
- Python experience
- GIS experience
- What do you want to learn?
- How can this course help you in everyday work?
- What would you do in a world without computers?

Goal

Develop geospatial thinking

Agenda

Day 1

- Intro
- Shapely
- Geopandas
- Map projections

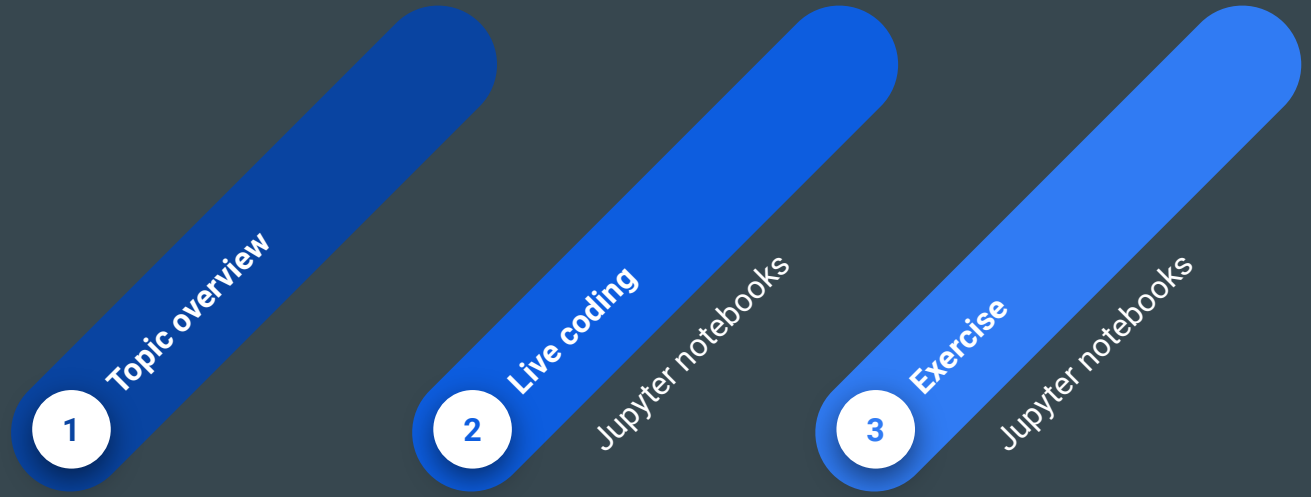
Day 2

- Geocoding
- Point in polygon
- Spatial join
- Geometric operations
- Classifiers

Day 3

- OSM data
- Network analysis
- Visualizations

Format


1
Topic overview
2
Live coding
Jupyter notebooks
3
Exercise
Jupyter notebooks

Day 1. Agenda

9:30-10:00 Intro

9:30-12:30 Live coding:

- Shapely
- Geopandas

12:30-13:30 Lunch break

13:30-14:30 Live coding:

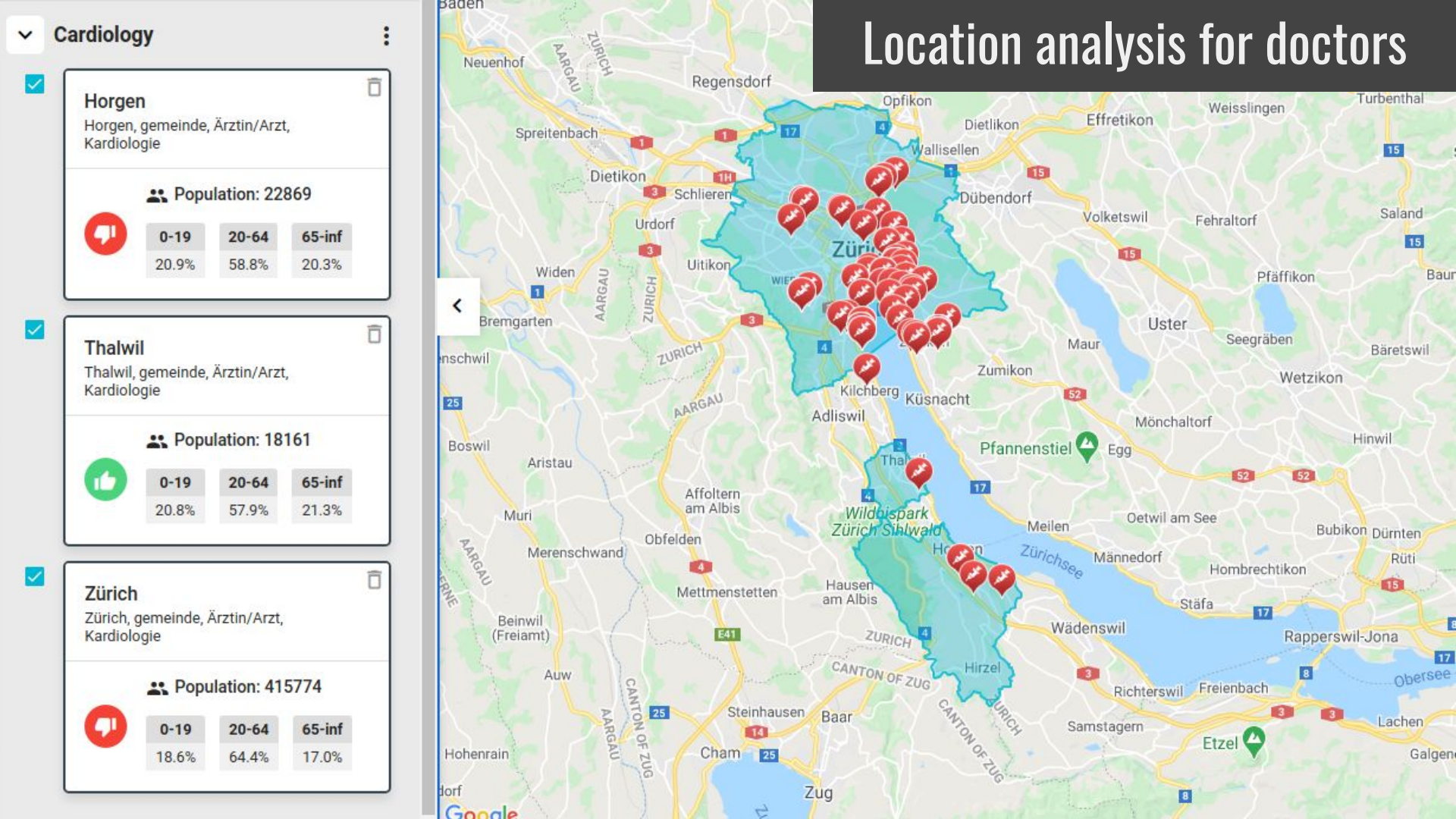
- Map projections

14:30-16:00 Exercise

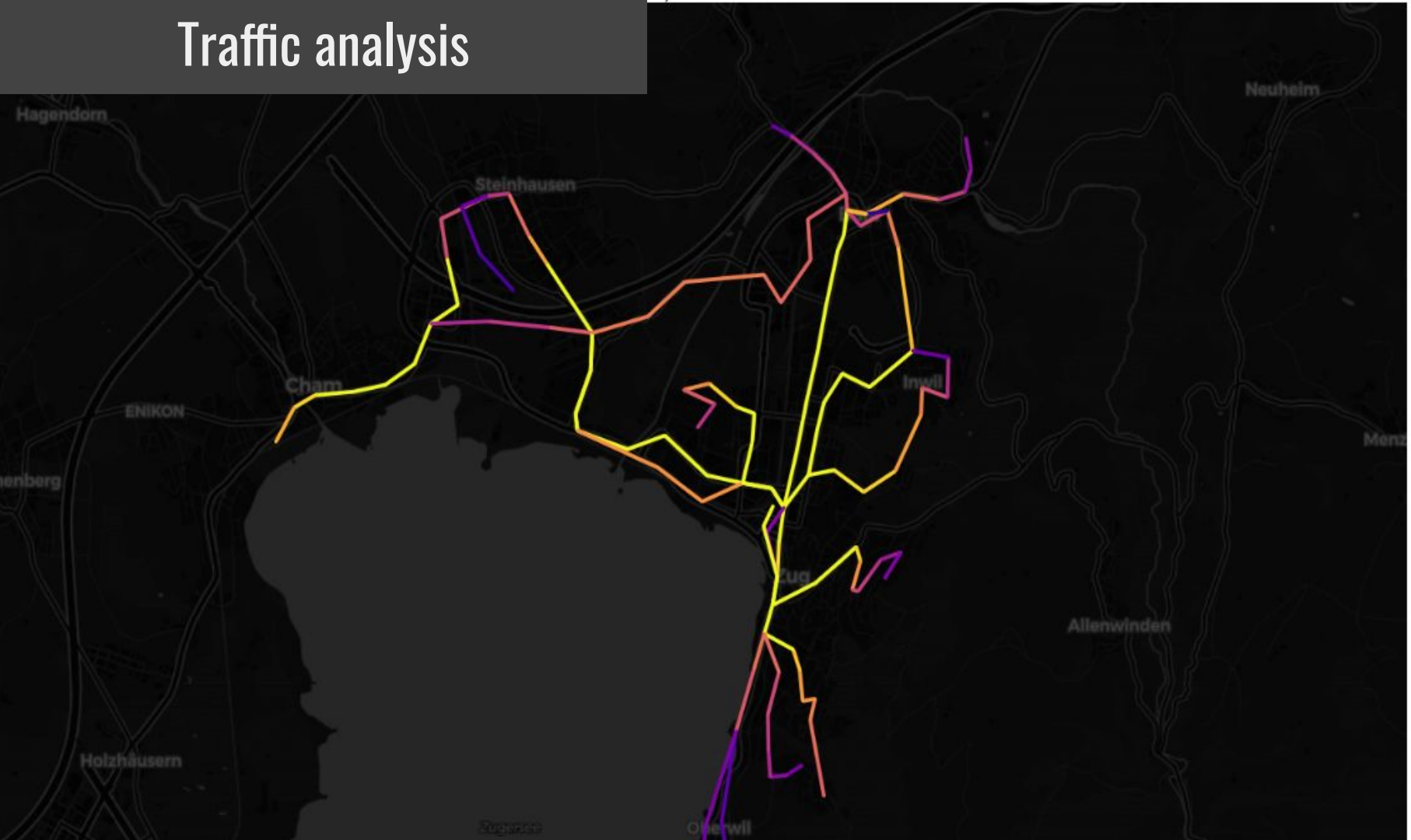
16:00-16:30 Exercise review

Python for GIS examples

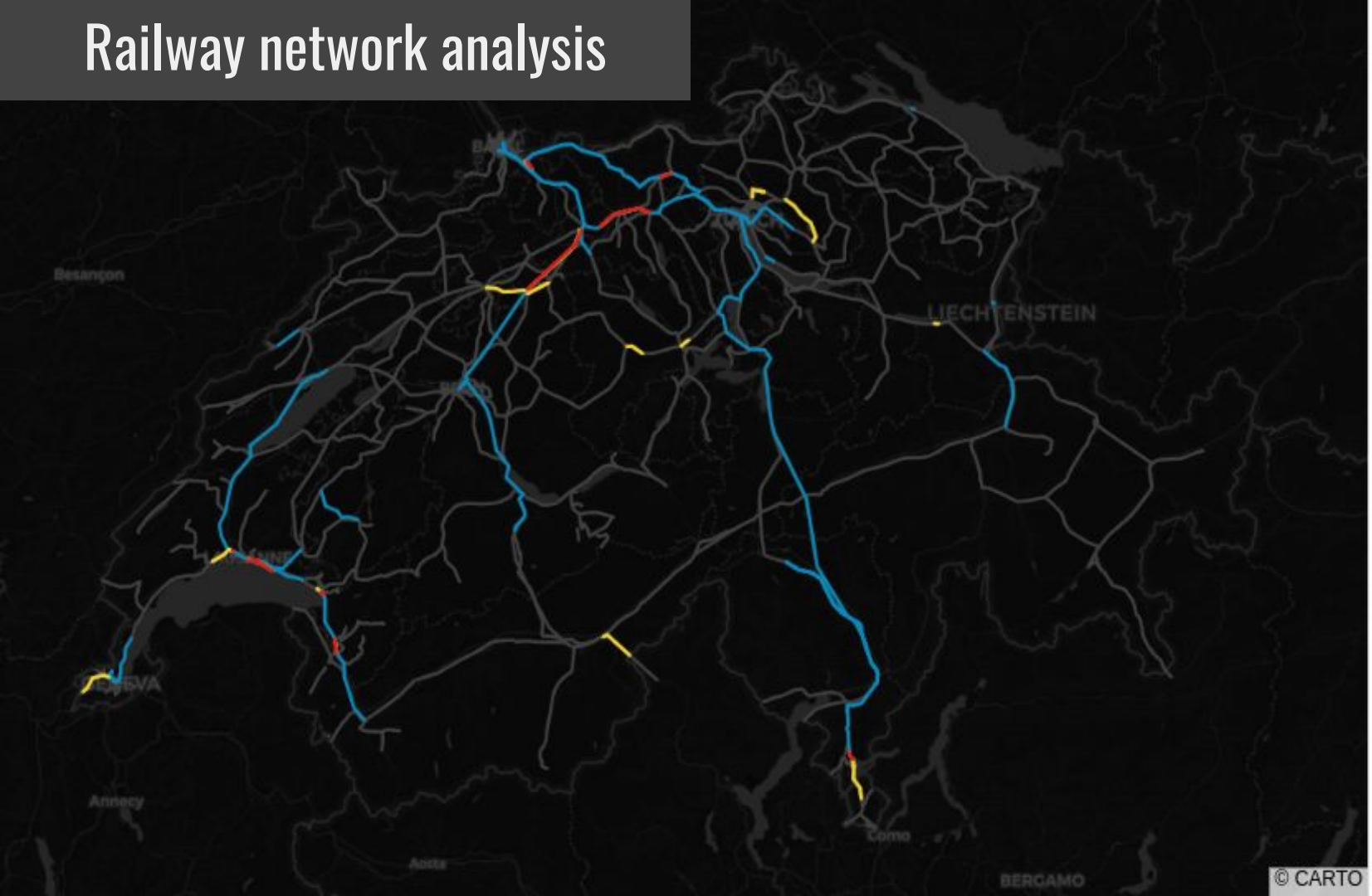
Location analysis for doctors



Traffic analysis



Railway network analysis



Municipality events

Your projects?

Python for GIS tools

GDAL, Geopandas, Shapely, Fiona, Pyproj, Pysal, Geopy, Contextily, GeoViews, Dash, OSMnx, Networkx, Cartopy, Scipy.spatial, Rtree, Rasterio, Rasterstats, RSGISLib, Matplotlib, Bokeh, Plotly, Pandas, Scipy, Basemap, Datashader, Folium, Mapclassify...

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GDAL, **Geopandas, Shapely**, Fiona, **Pyproj**, Pysal, **Geopy**, **Contextily**, GeoViews, Dash, **OSMnx, Networkx,** Cartopy, Scipy.spatial, Rtree, Rasterio, Rasterstats, RSGISLib, **Matplotlib, Bokeh**, Plotly, **Pandas**, Scipy, Basemap, Datashader, Folium, **Mapclassify**...

Setup

- Virtual machines:
  - https://jupyter.zazukoians.org/
  - User: yourname
- Jupyter notebooks:
  - Lecture file => we code together
  - Solutions file => if you fall behind

Use VMs for all exercises!

Materials

- VMs until 01.04.2021
- Afterwards: source code on github
  - https://github.com/zazuko/gis-training
  - **Use virtual environment** for setup!!!

To export your solutions:

- Export notebooks, or
- Use terminal

Lecture flow

He who asks a question is a fool for five minutes. He who does not ask a question remains a fool forever.

Chinese proverb

Let’s get started!

Exercises

- 2x4 people groups
  - Breakout room
  - Main room => questions and hints
- Exercise:
  - Save your results in module/solutions.ipynb file
  - Make your code modular => use functions
- Discussion:
  - Random participants share their results with class
  - Revisit the same exercise tomorrow morning

Exercises

```
if not calm:
    keep_calm()
else:
    keep_coding()
```

Day 2. Agenda

9:30-9:45 Exercises review

9:45-12:30 Live coding:

- Geocoding
- Point in polygon
- Spatial join

12:30-13:30 Lunch break

13:30-15:15 Live coding:

- Classification
- Geometric operations

15:15-16:15 Exercise

16:15-16:30 Exercise review

Let’s get started!

Day 3. Agenda

9:30-10:00 Exercises review

10:00-12:30 Live coding:

- Retrieving OSM Data
- Network analysis
- Map visualizations

12:30-13:30 Lunch break

13:30-16:00 Exercise

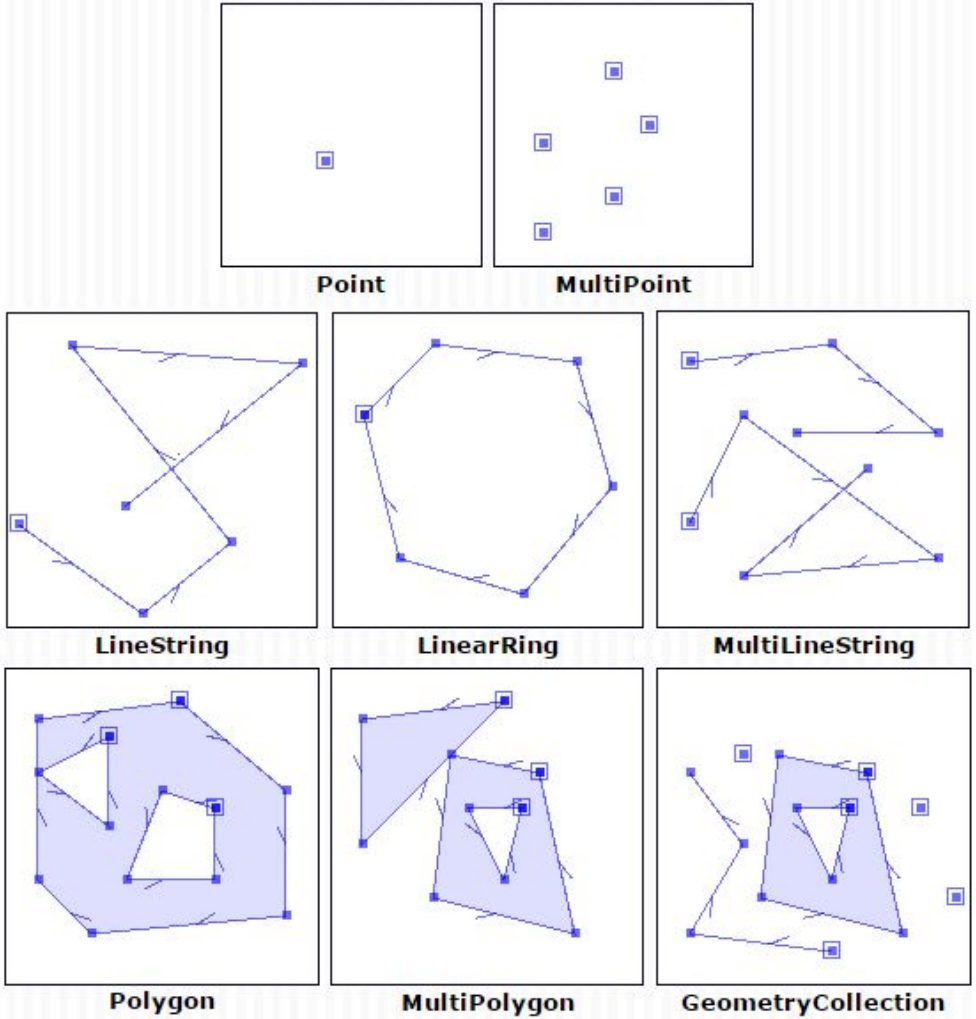
16:00-16:15 Exercise review

16:15-16:30 Wrap up

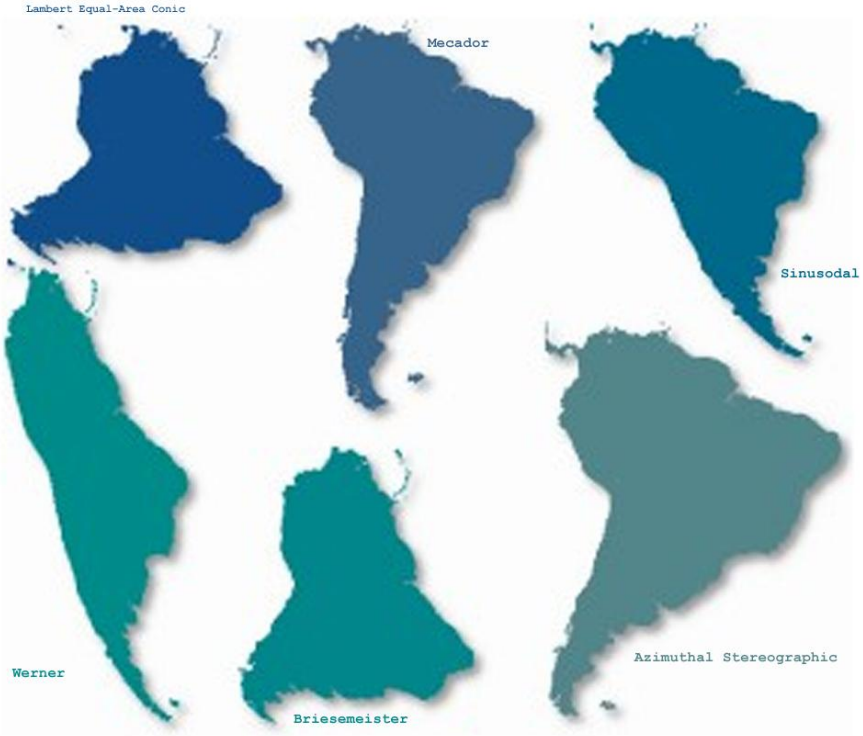
Let’s get started!

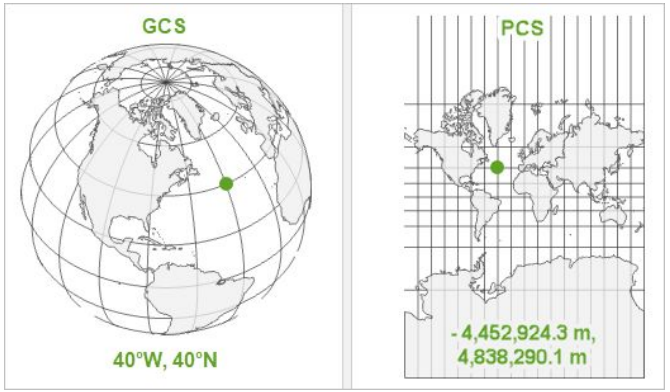
Wrap up

Spatial data model



Map projections and CRS

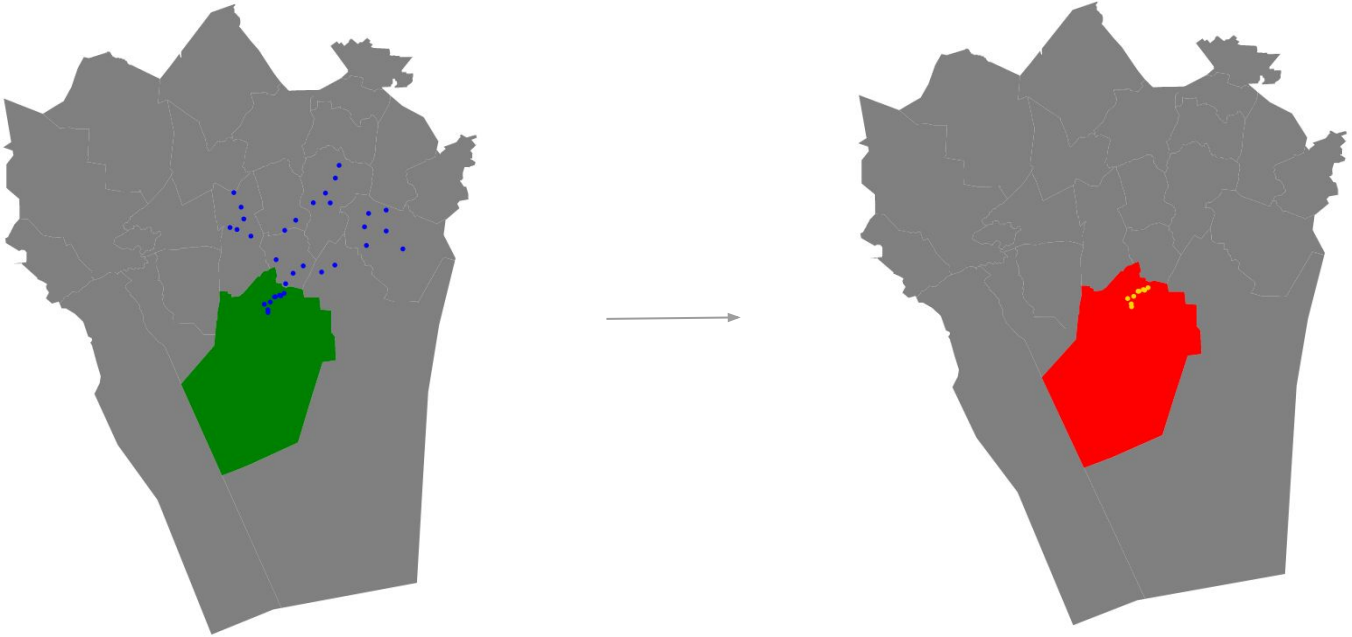




Geocoding

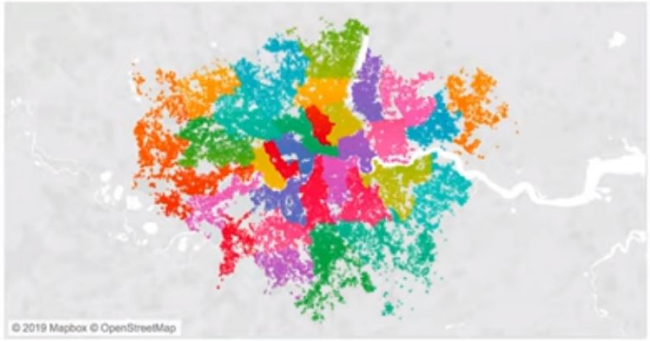

Haid- und Neu-Straße 15
76131 Karlsruhe
Germany
49° 0′ 24.804″ N
8° 24′ 13.15″ E

Point in polygon



Spatial join

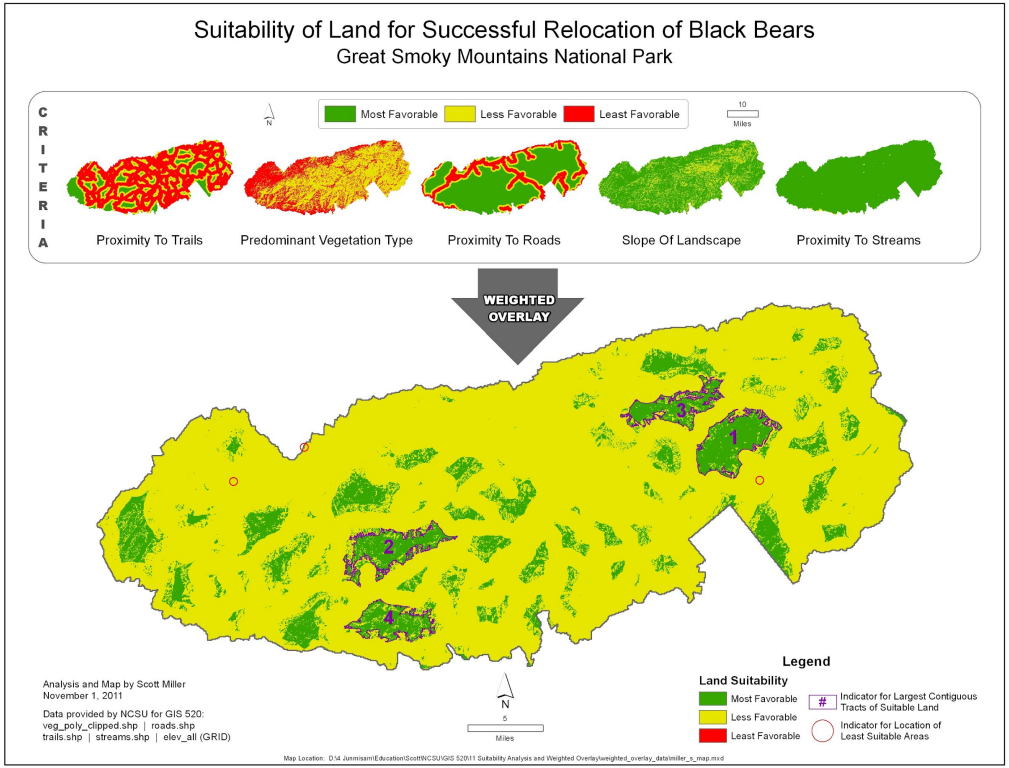
1. Crime Data for London



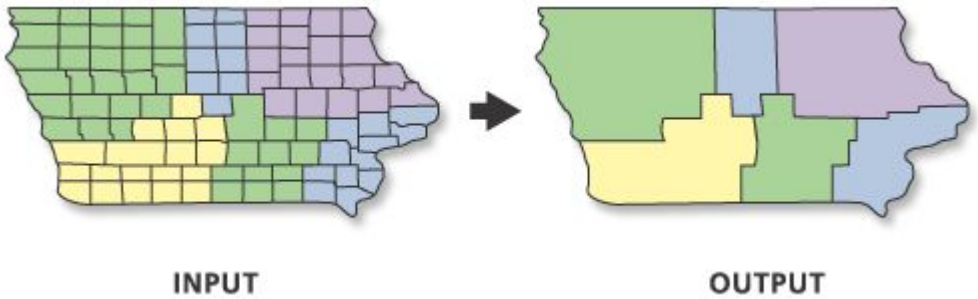
1. London Boroughs

Number of Crimes in London Boroughs

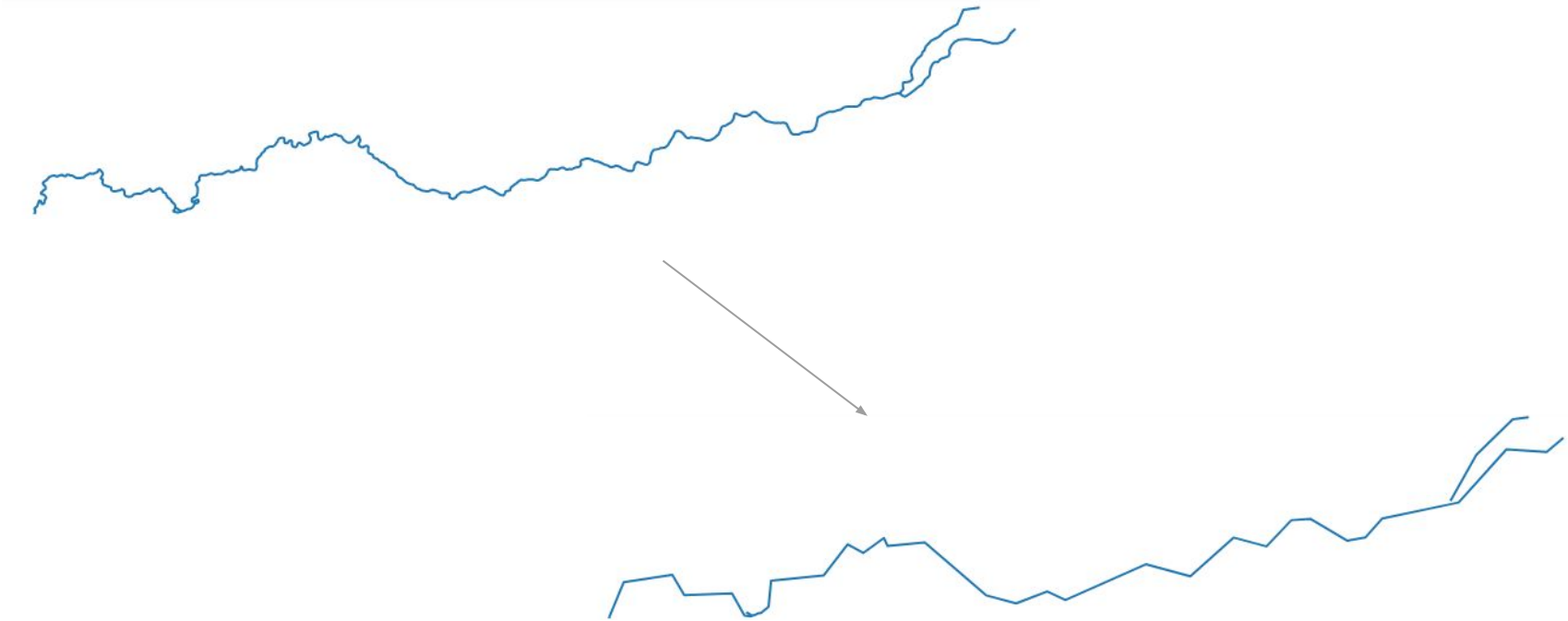
Overlay analysis



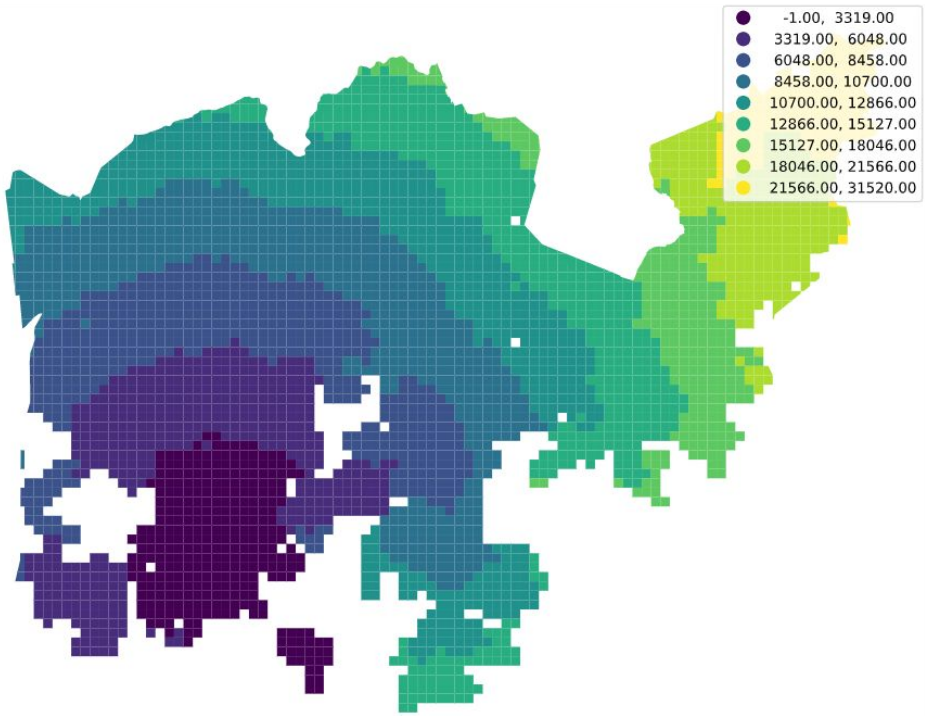
Data aggregation



Geometry simplification

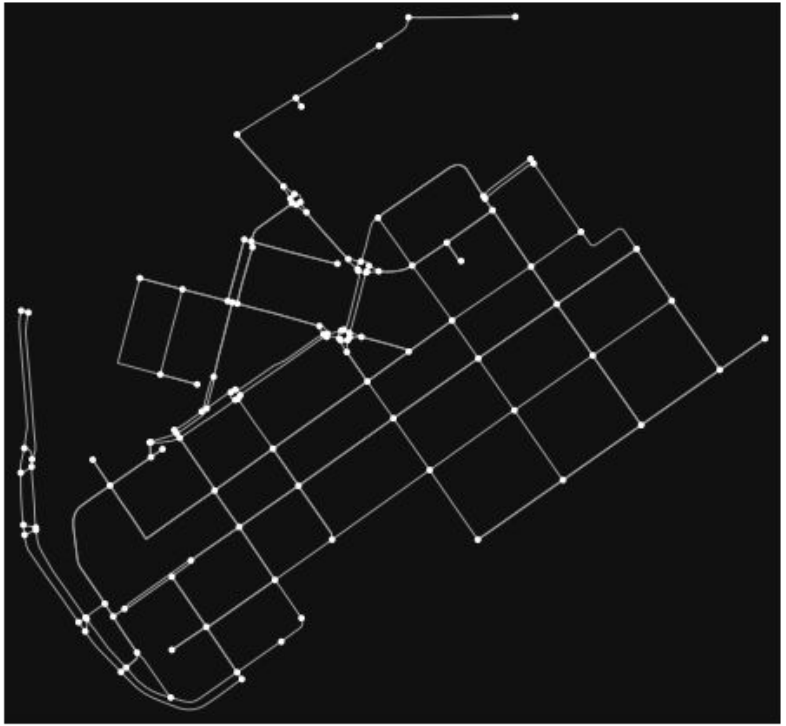


Data classification

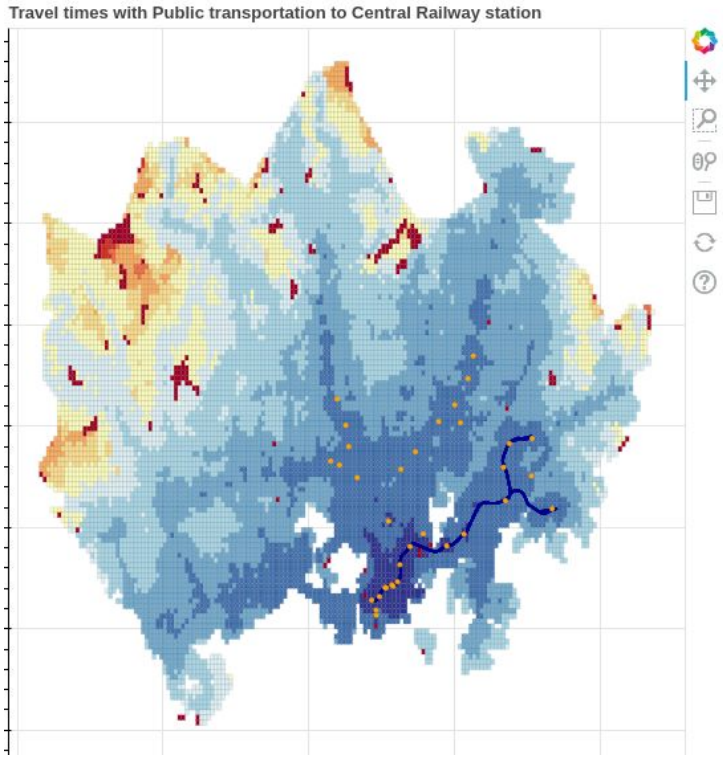


OSM data

Network analysis



Visualizations



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Thank you!

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