

Data Visualizations

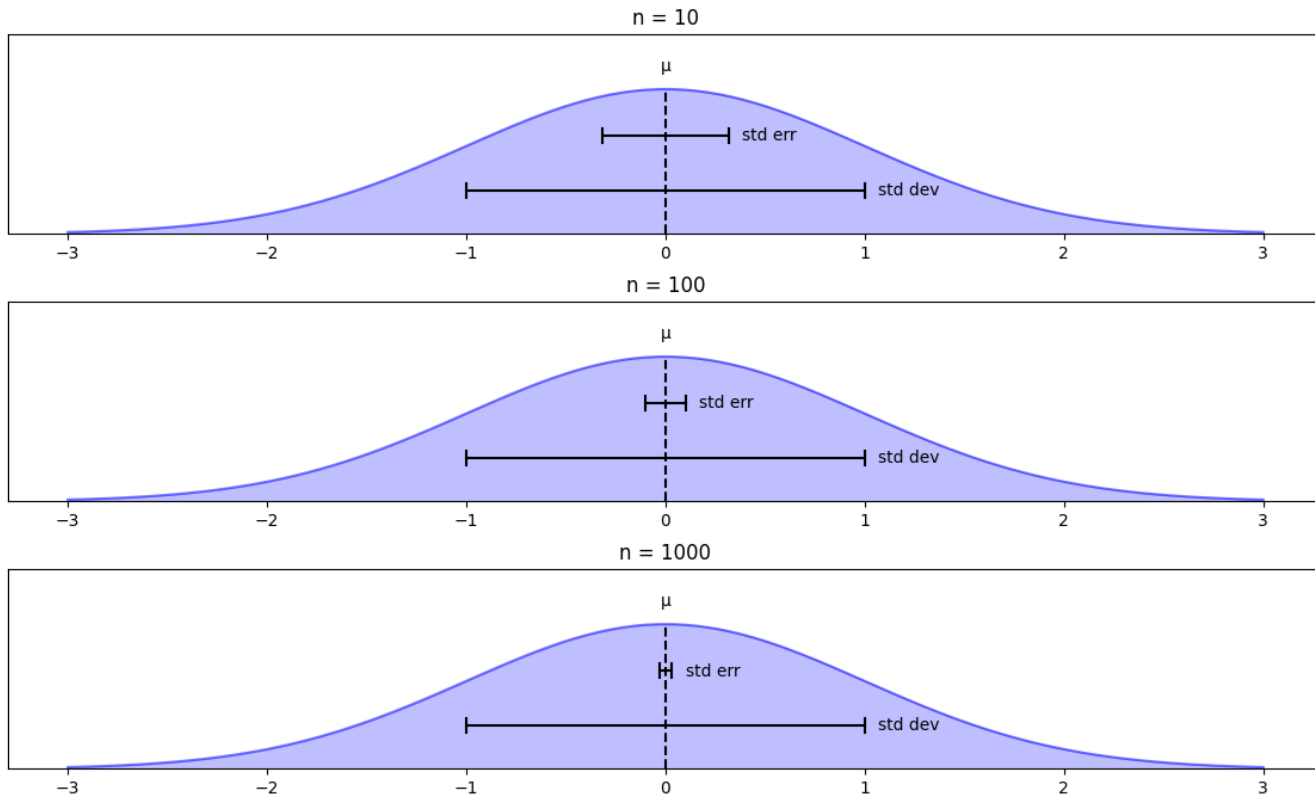
Uncertainty

Standard error

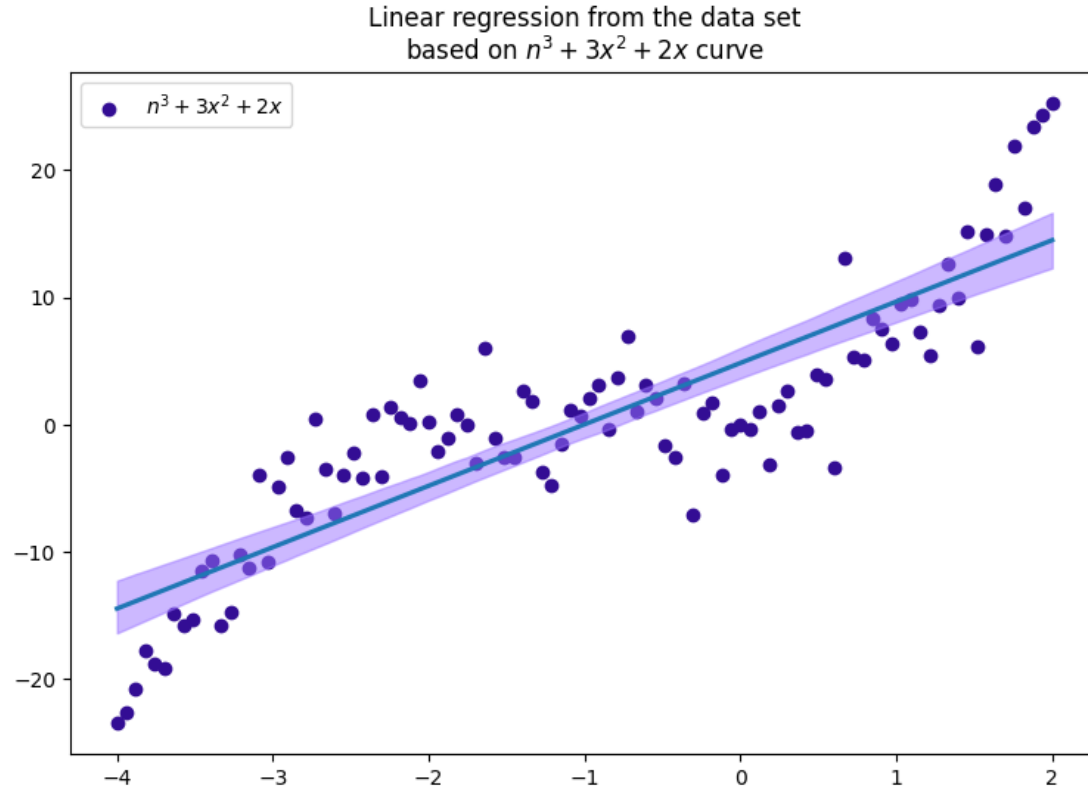
$$SE = \frac{\sigma}{\sqrt{n}}$$

$$CI = \bar{x} \pm z \frac{\sigma}{\sqrt{n}}$$

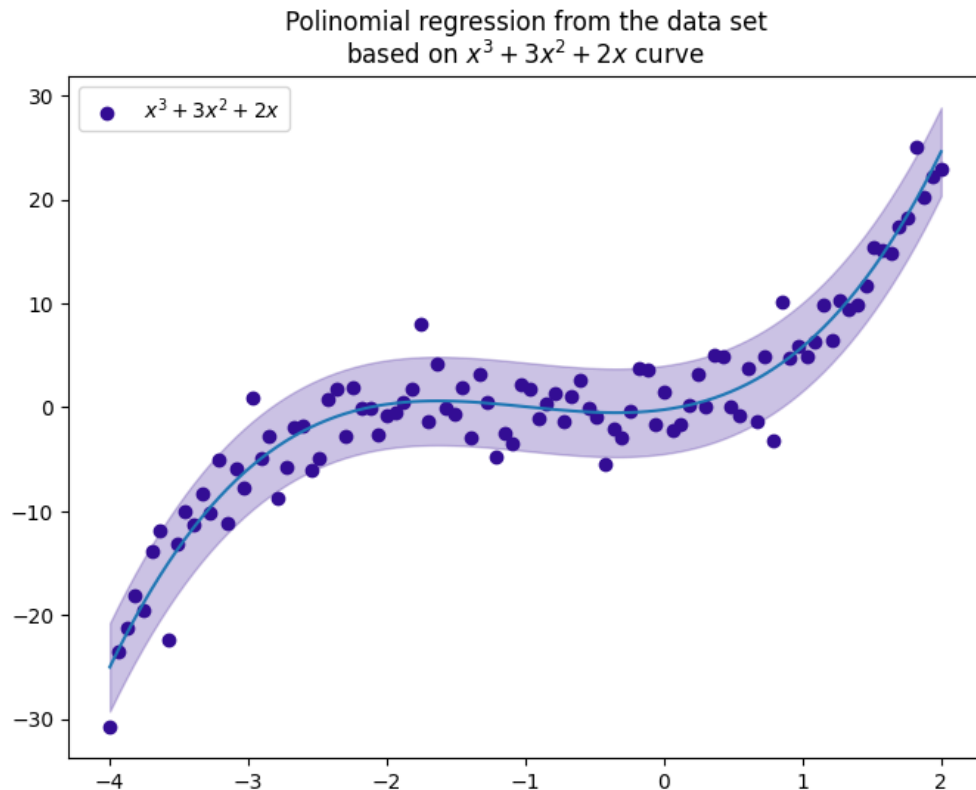
Standard error



Uncertainty range for linear regression



Uncertainty range for polynomial regression



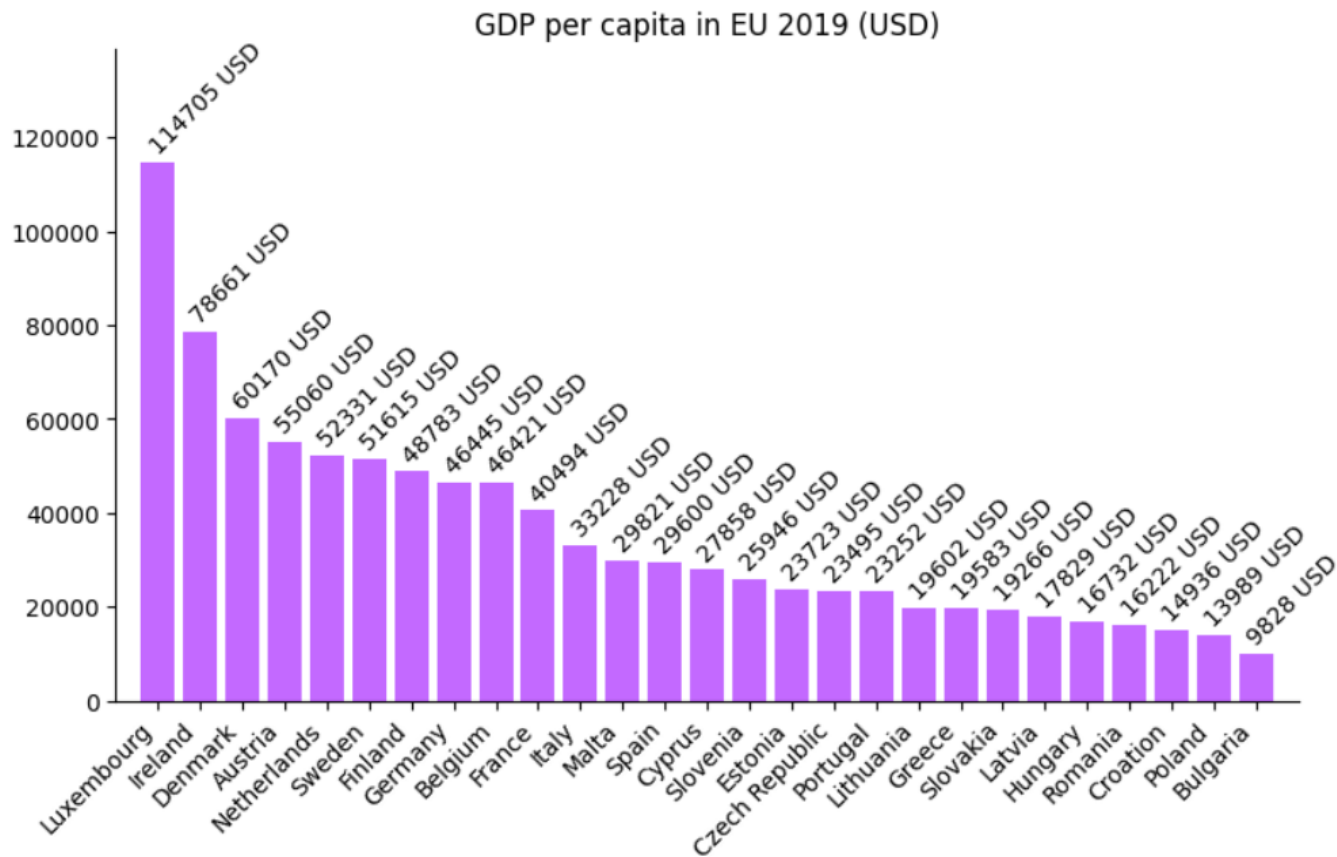
Geospatial

Ways of representing a map

Why we need maps?

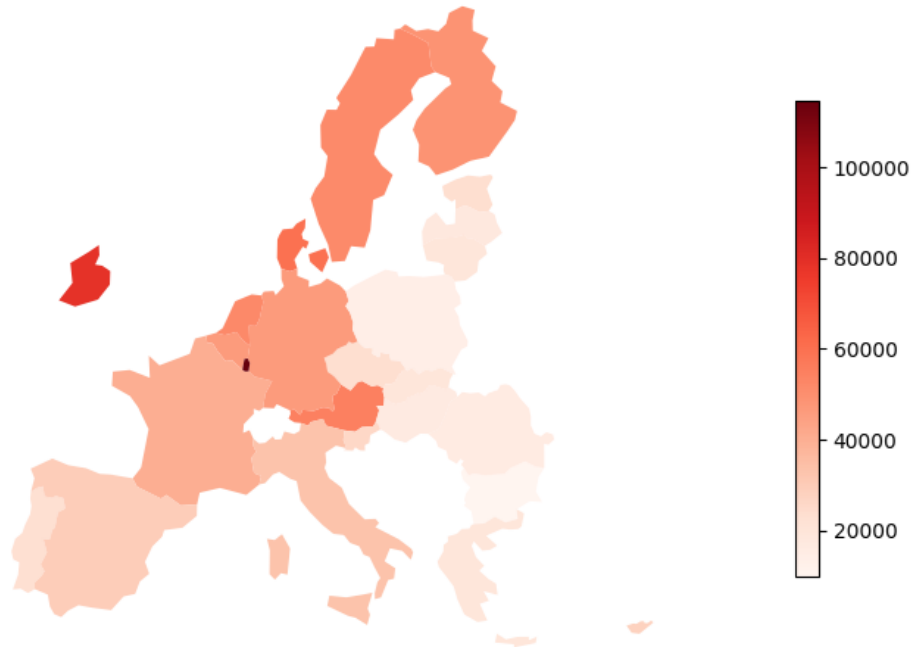
	country	GDP per capita (USD)
0	Austria	55060
1	Belgium	46421
2	Bulgaria	9828
3	Croatia	14936
4	Cyprus	27858
5	Czech Republic	23495
6	Denmark	60170
7	Estonia	23723
8	Finland	48783
9	France	40494

Why we need maps?

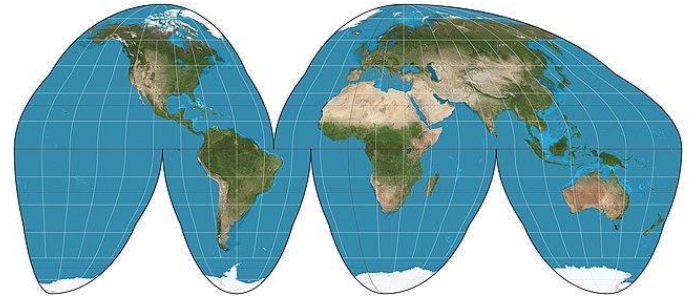
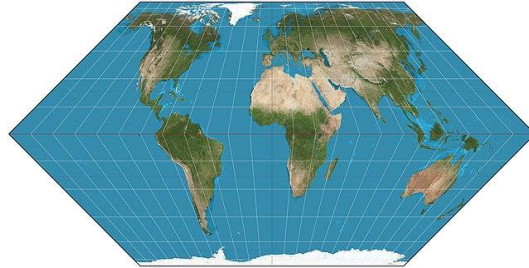
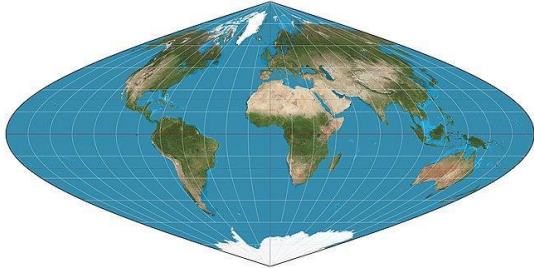
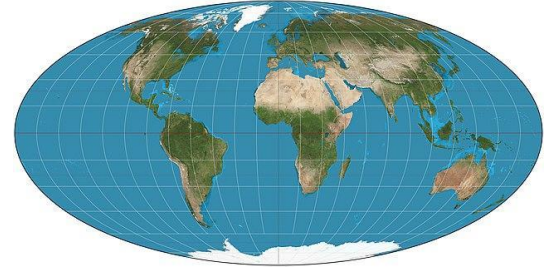
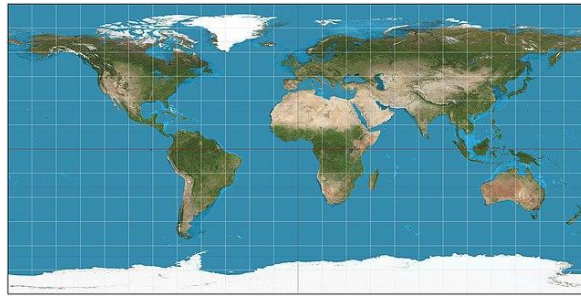
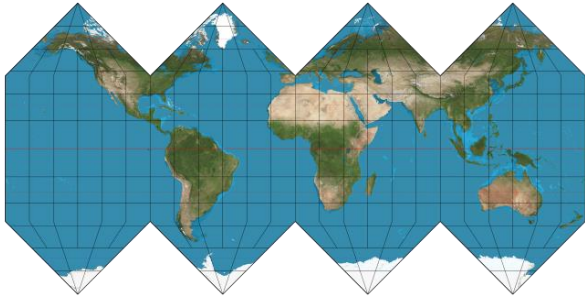


Why we need maps?

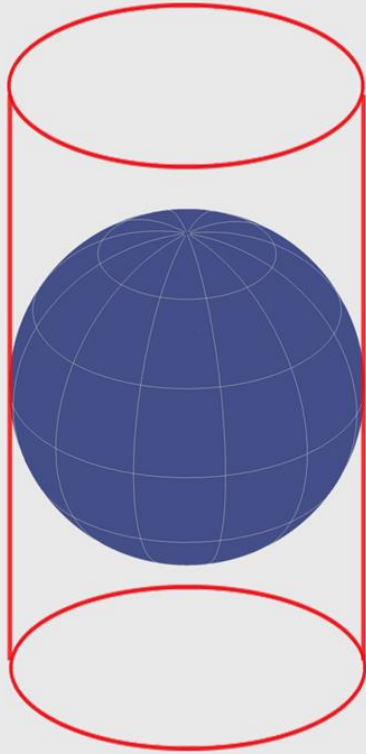
GDP per capita in EU 2019 (USD)



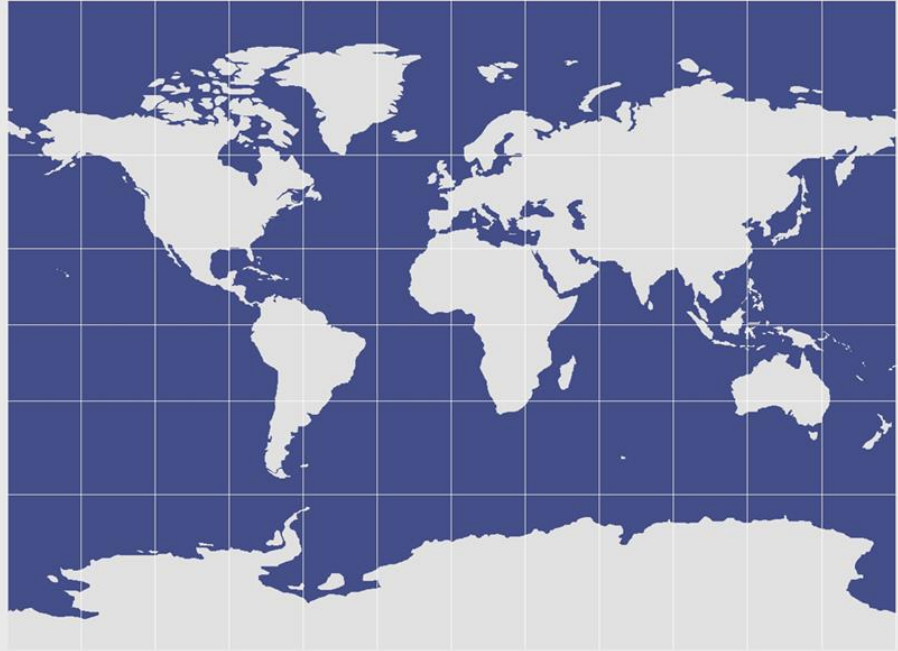
Many, many different projections...



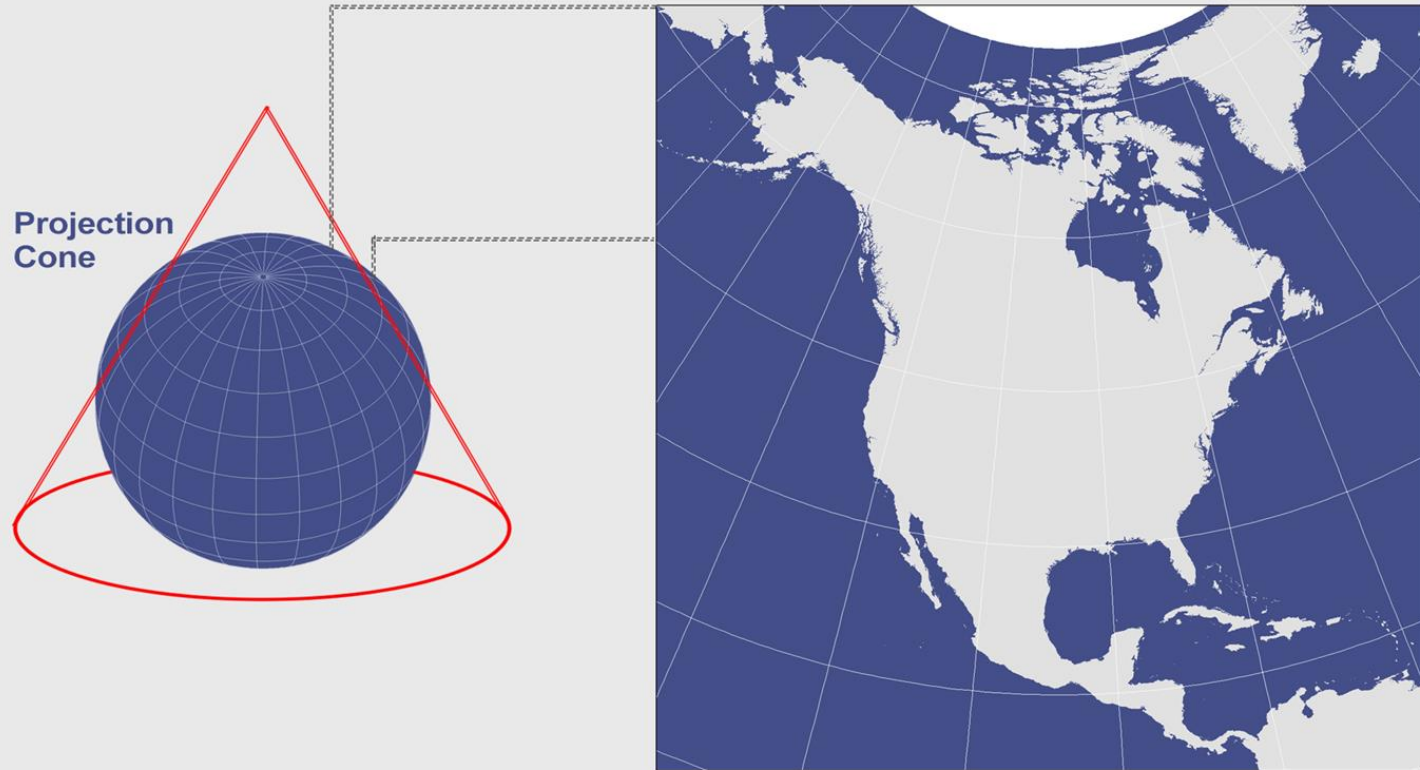
Mercator projection



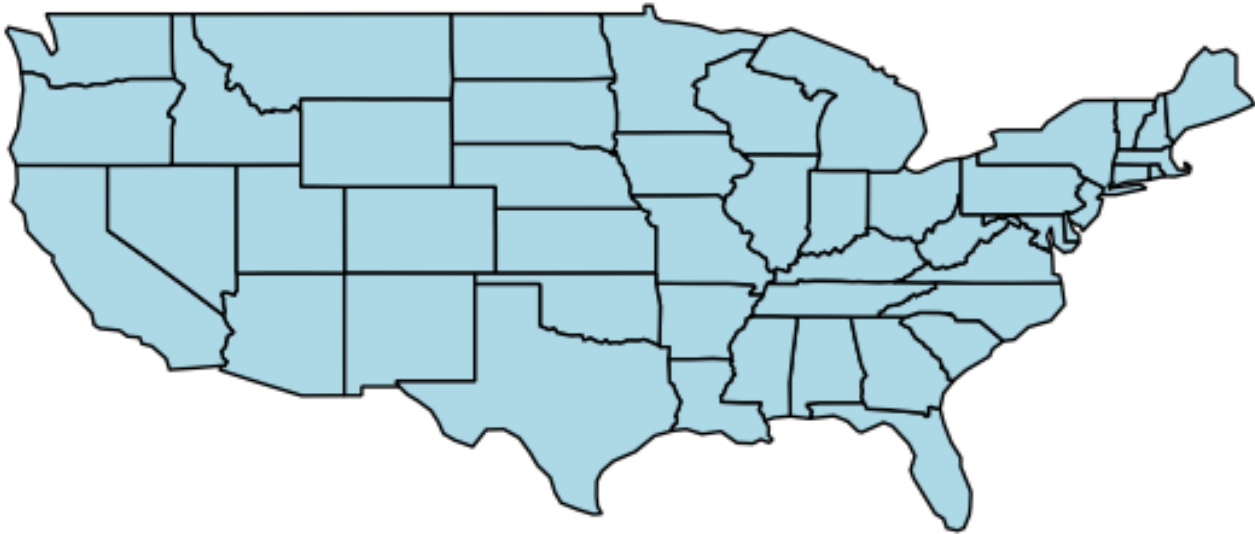
Projection
Cylinder



Albers projection



Mercator projection



Albers projection



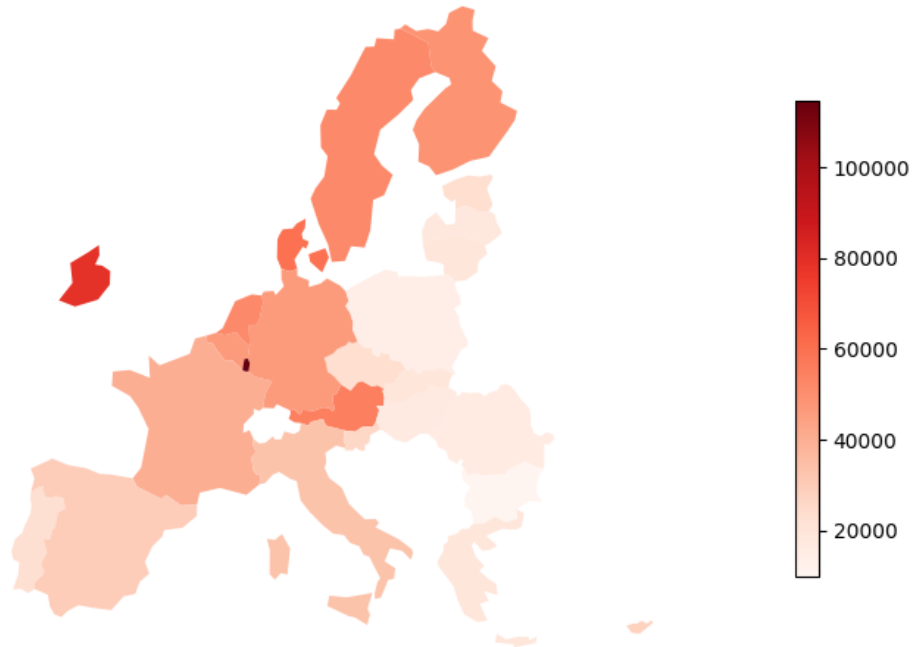
Mercator vs. Albers projection comparison



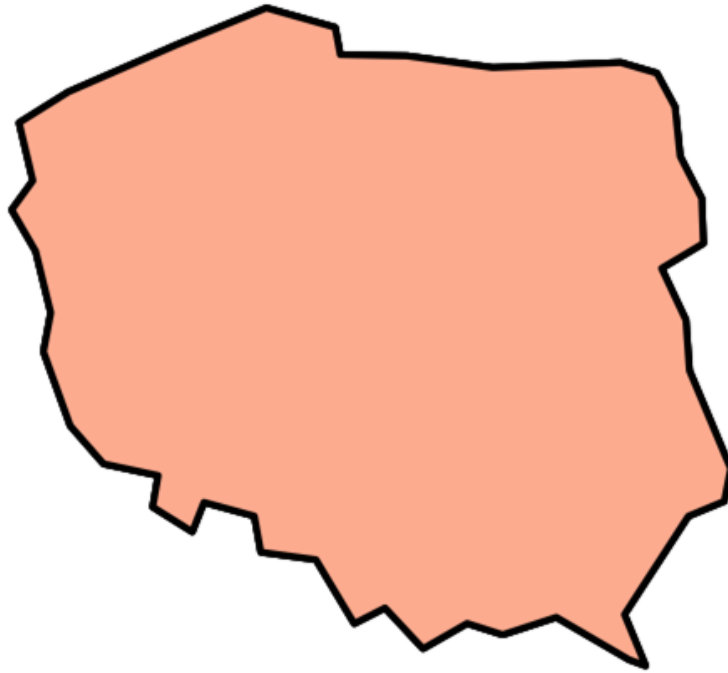
Types of map visualizations

Choropleth

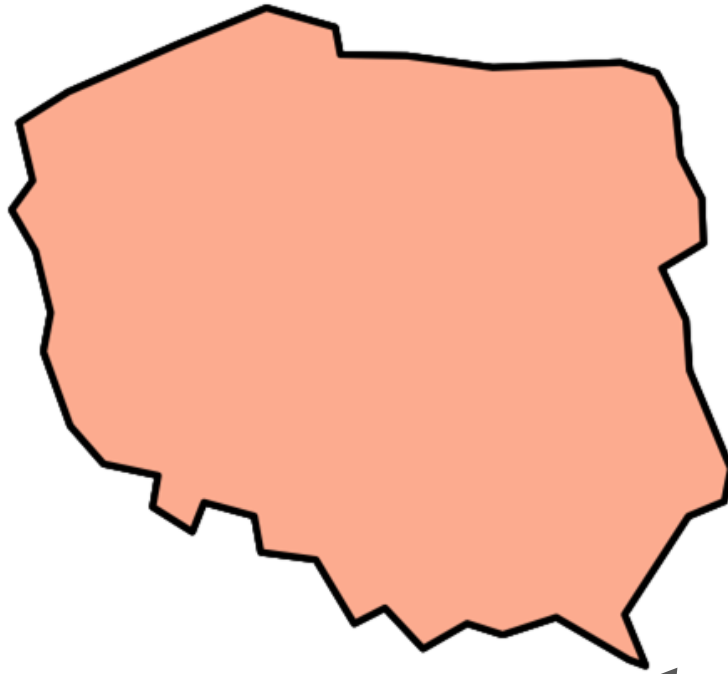
GDP per capita in EU 2019 (USD)



Choropleth

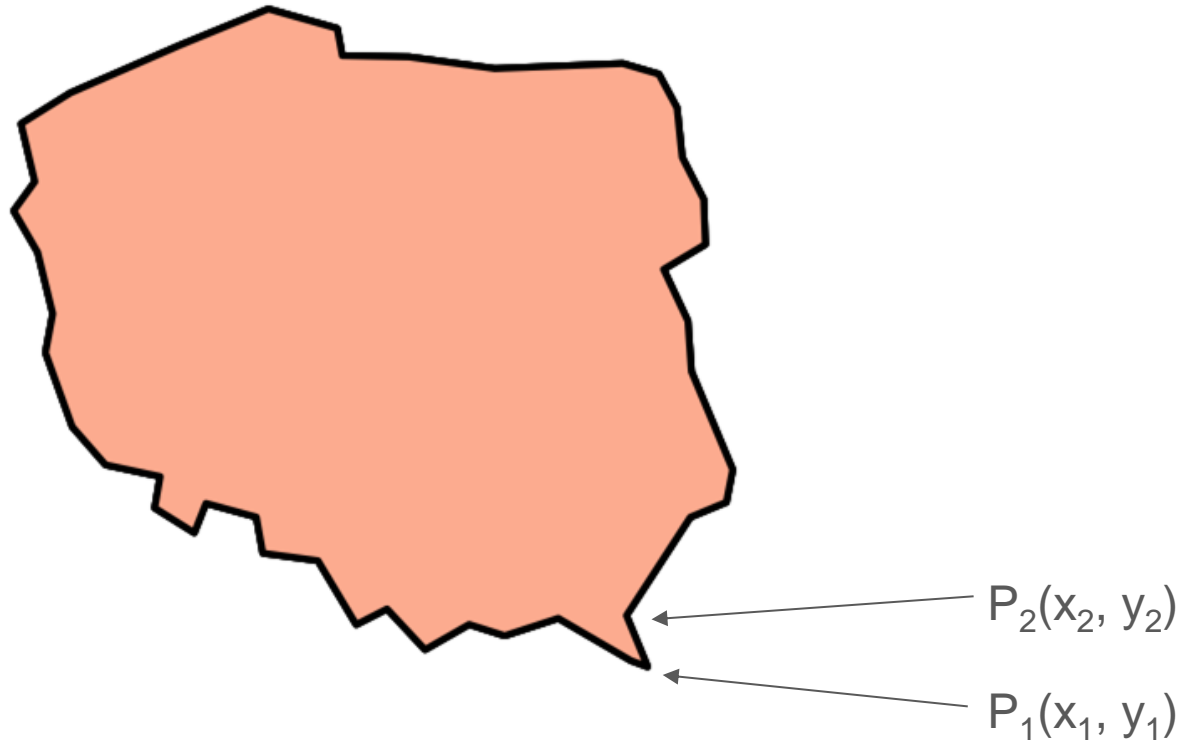


Choropleth

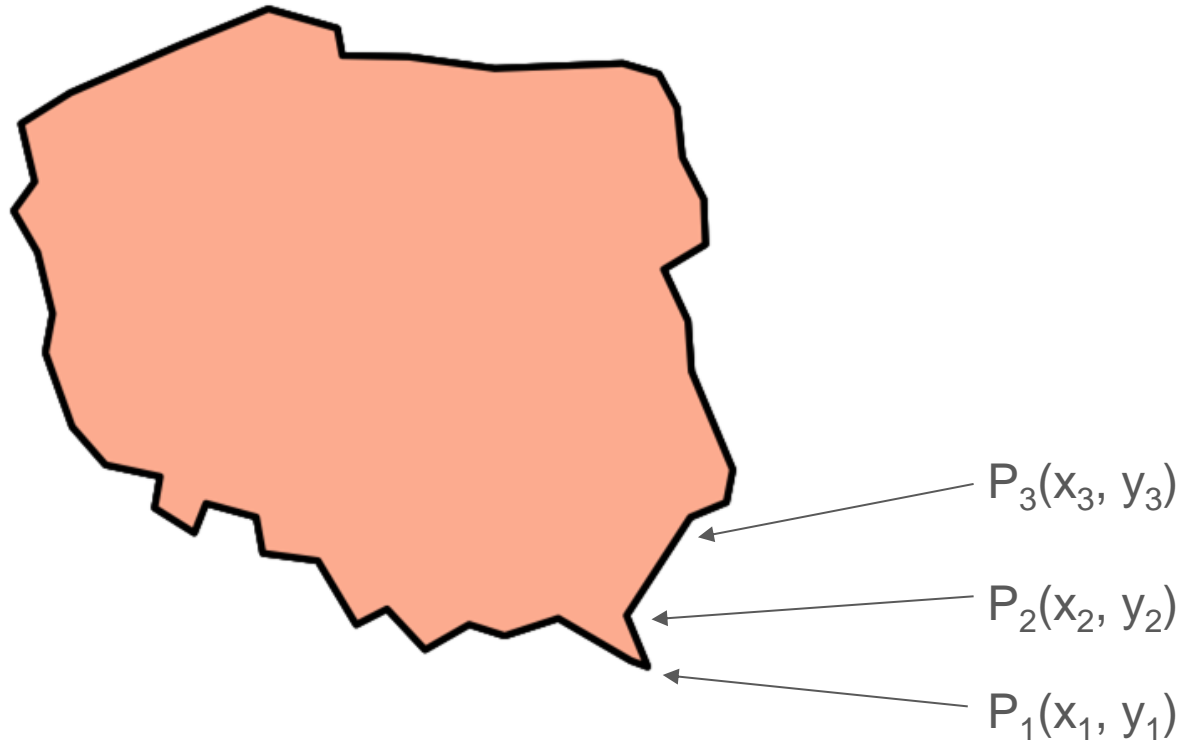


$P_1(x_1, y_1)$

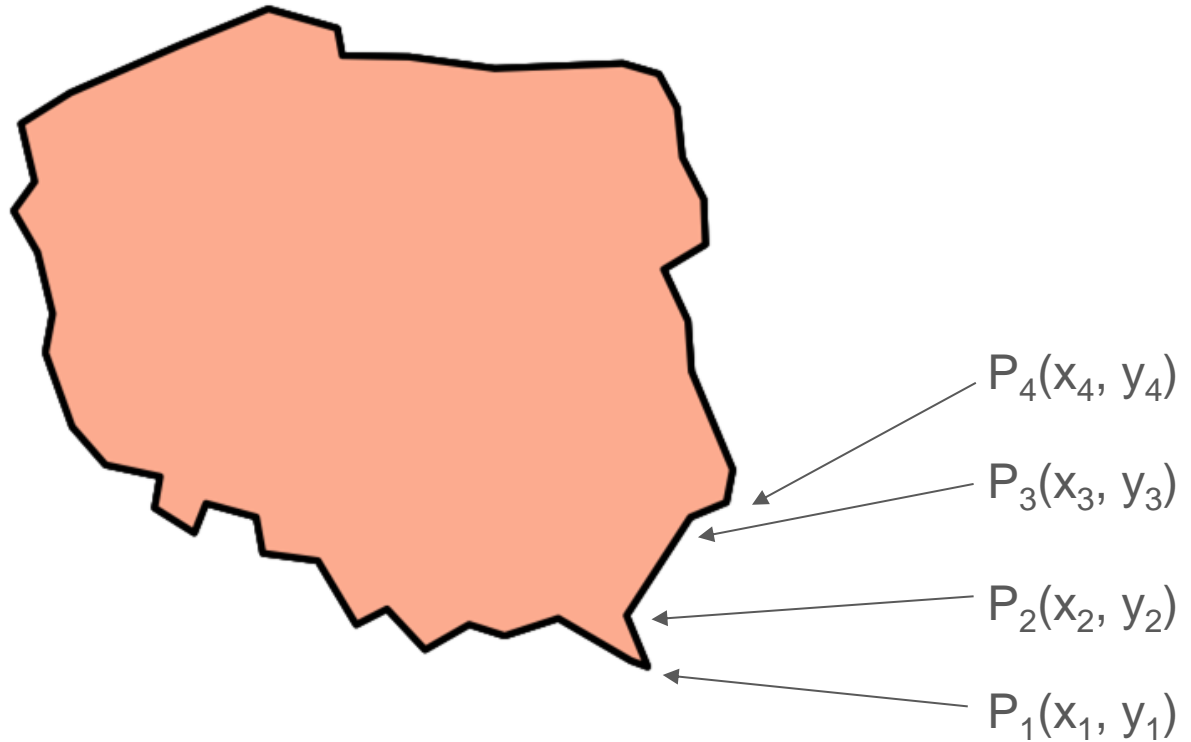
Choropleth



Choropleth

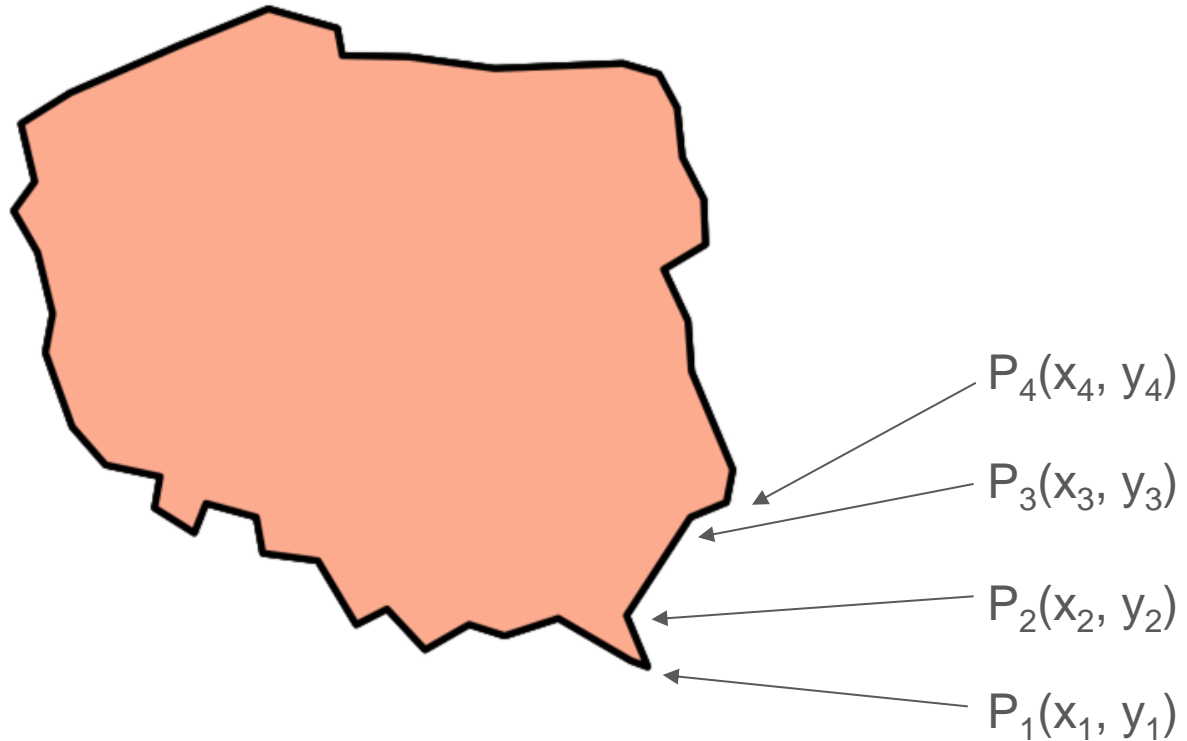


Choropleth



Choropleth

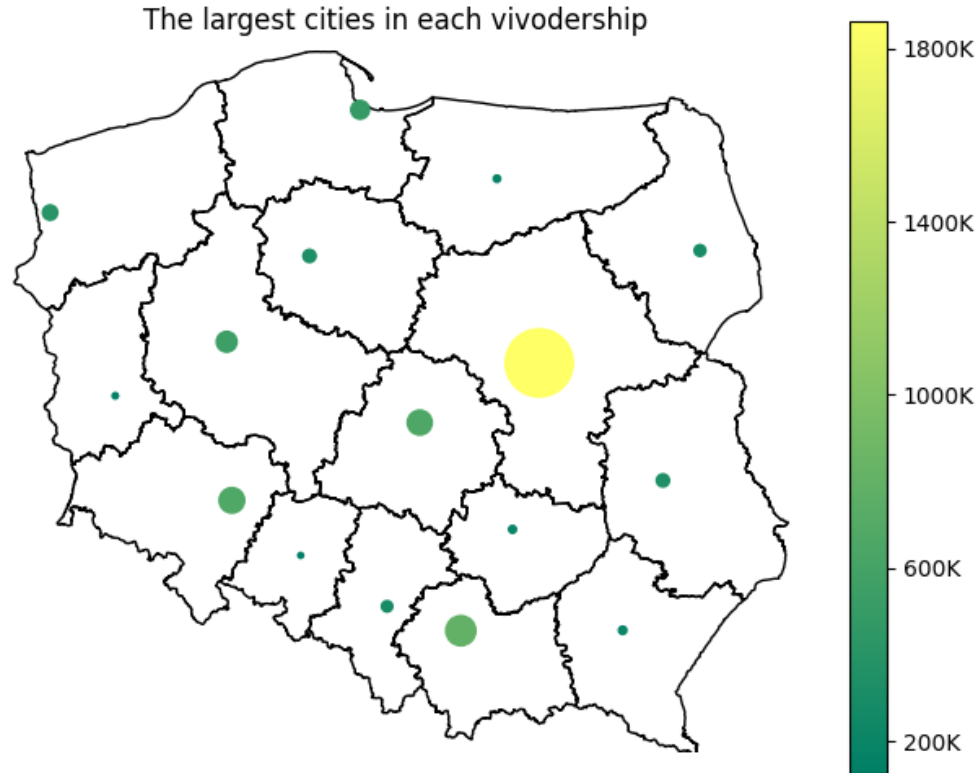
Poland = [
 $P_1(x_1, y_1)$,
 $P_2(x_2, y_2)$,
 ...,
 $P_n(x_n, y_n)$
]



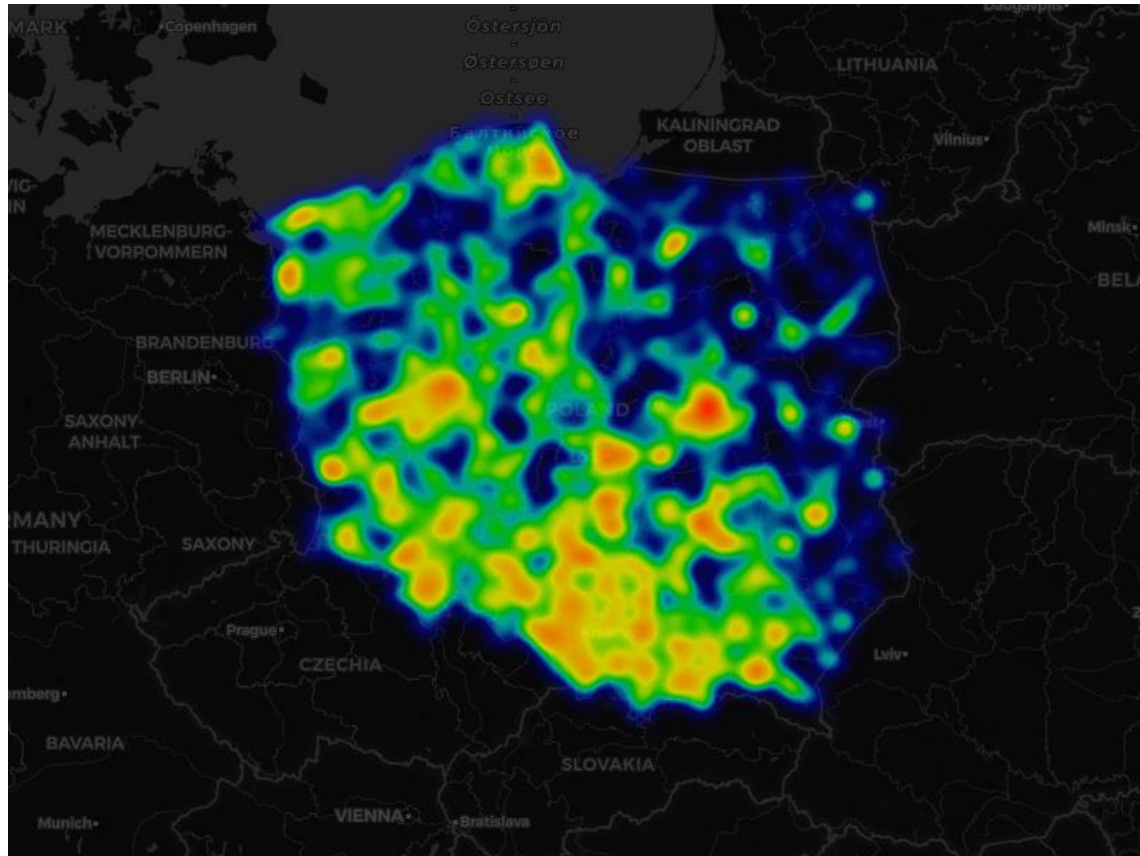
GeoJSON

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {"name": "Poland"},
      "geometry": {
        "type": "Polygon",
        "coordinates": [[
          [15.016996, 51.106674],
          [14.607098, 51.745188],
          ...,
          [15.490972, 50.78473],
          [15.016996, 51.106674]
        ]]
      },
      "id": "POL"
    },
    ...
  ]
}
```

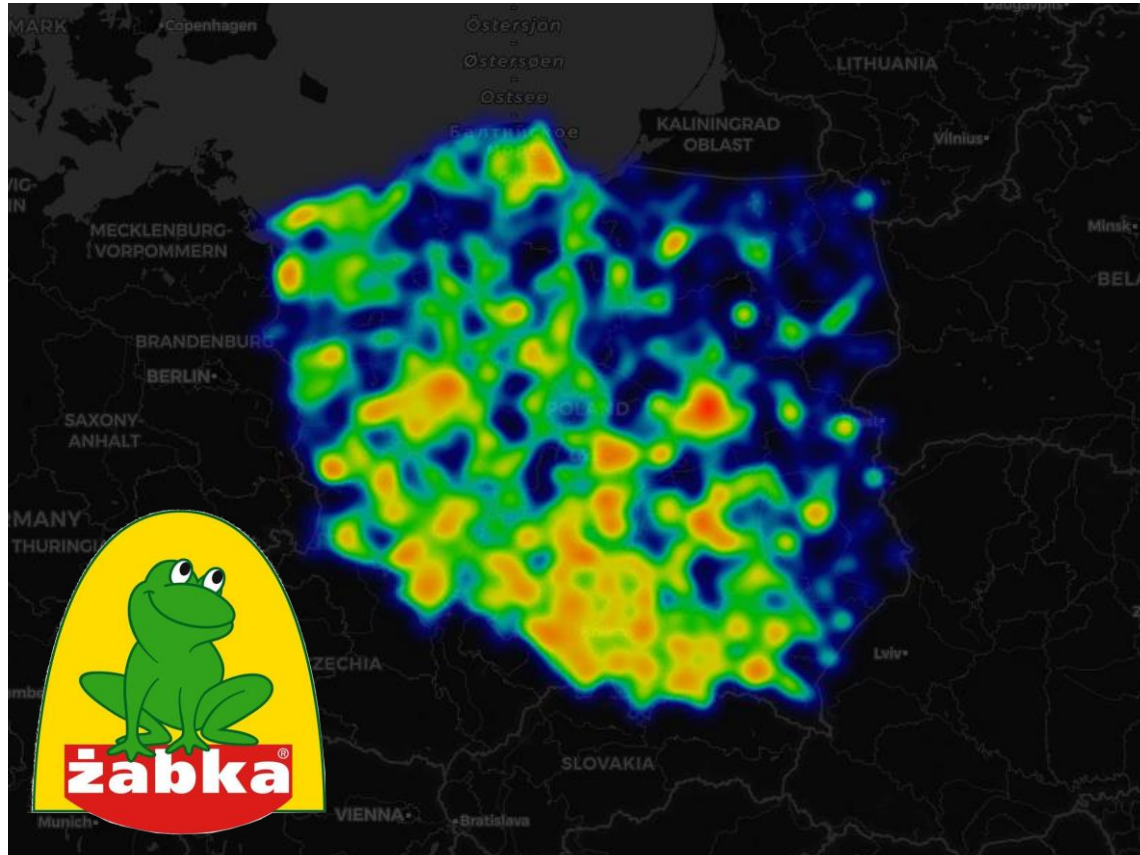
Bubble graph on map



Cartogram heatmap



Cartogram heatmap



References

Information sources:

- [1] Wes McKinney, [Python for Data Analysis, 3E](#) (2022), Wes's Blog
- [2] Claus O. Wilke, [Fundamentals of Data Visualization](#) (2019), Claus Website
- [3] [Geoplot documentation](#)
- [4] [Map projection](#), Wikipedia, access date: 23.10.2024
- [5] [Mercator projection](#), Wikipedia, access date: 23.10.2024
- [6] [Albers projection](#), Wikipedia, access date: 23.10.2024
- [7] [List of map projections](#), Wikipedia, access date: 23.10.2024
- [8] [Cylindrical Projections Mercator, Miller and Pseudocylindrical](#) (2024), GISGeography
- [9] [Conic Projection Lambert, Albers and Polyconic](#) (2023), GISGeography

Data sources:

- [10] Rachael Tatman, [Chocolate Bar Ratings](#) (2017), Kaggle
- [11] Chris Riederer, [world.geo.json](#), Github
- [12] Piotr Patrzyk, [polska-geosjon](#), Github

Other:

- [13] [My private notes about data visualization an examples](#)