



Group of  
**H**orribly  
**O**ptimistic  
**S**Tatisticians

# ○ Data Visualizations pt.3

Intro to Data Science

Maksymilian Norkiewicz & Jędrzej Ogrodowski



# Uncertainty



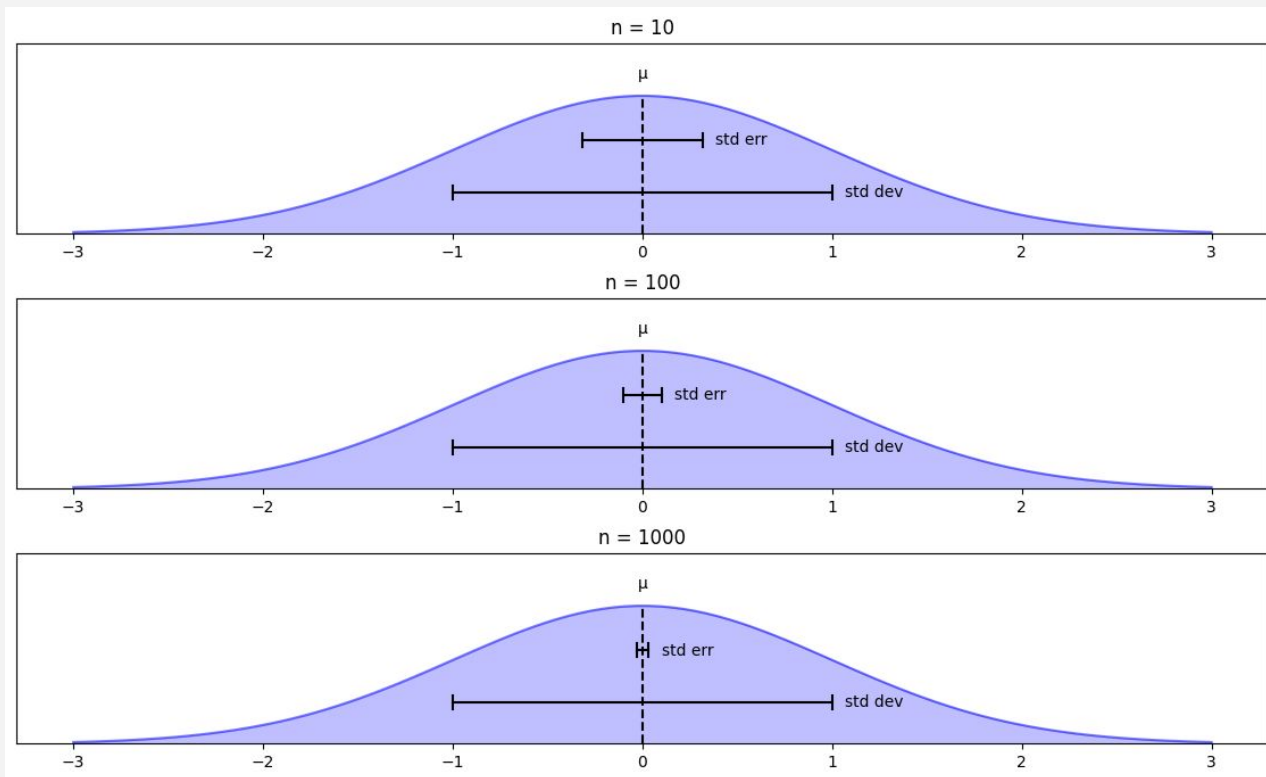
# Standard error

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

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

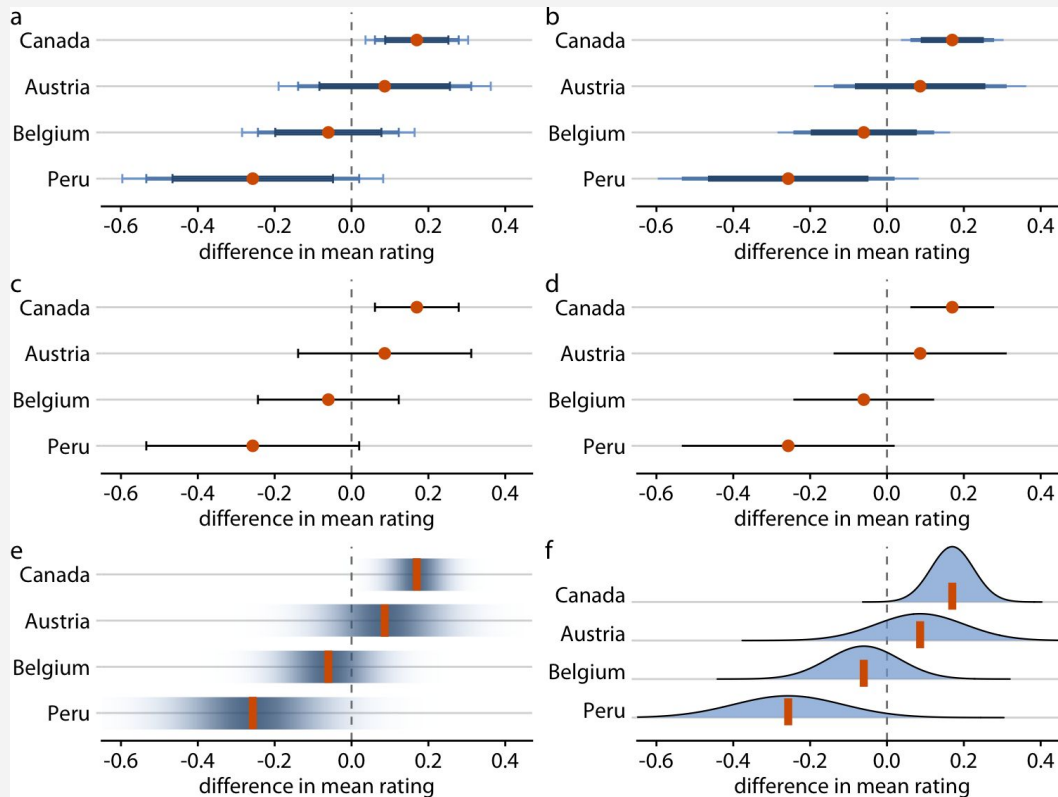


# Standard error



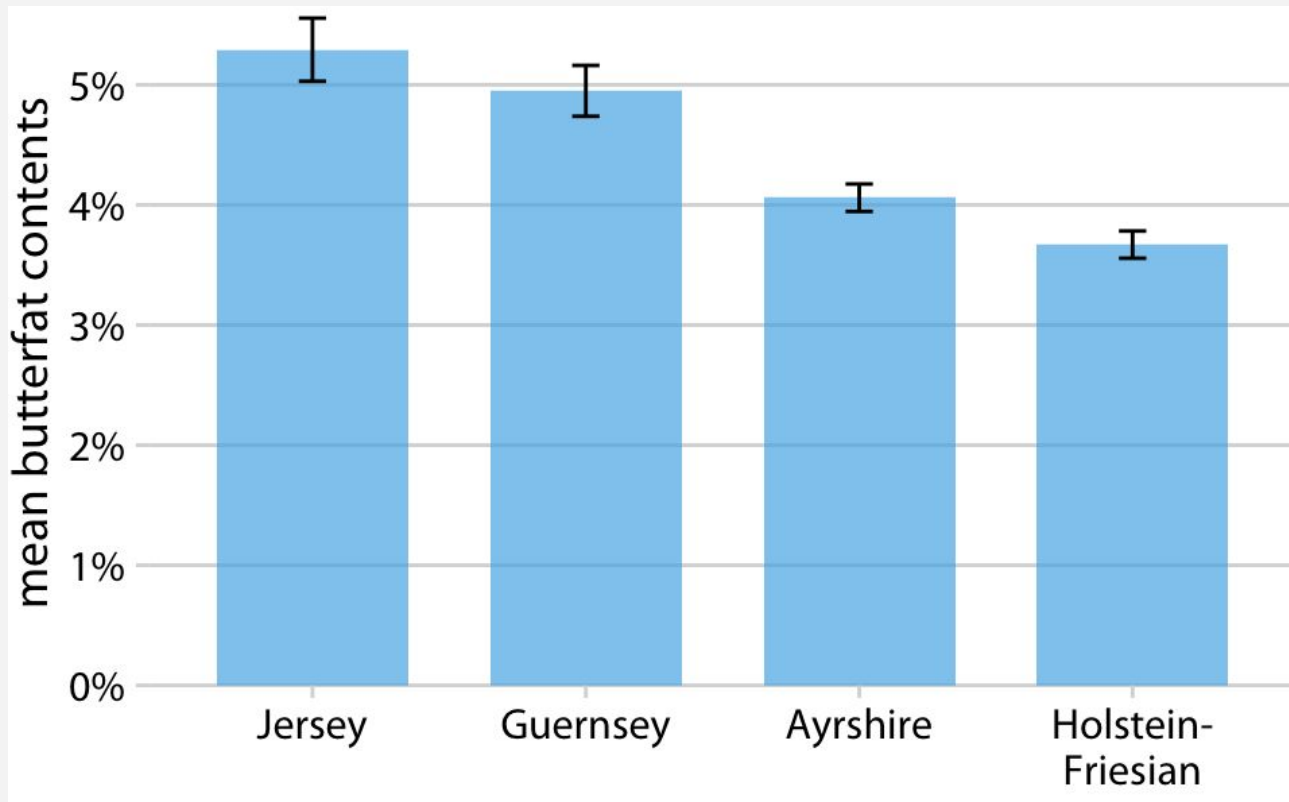


# Confidence Intervals



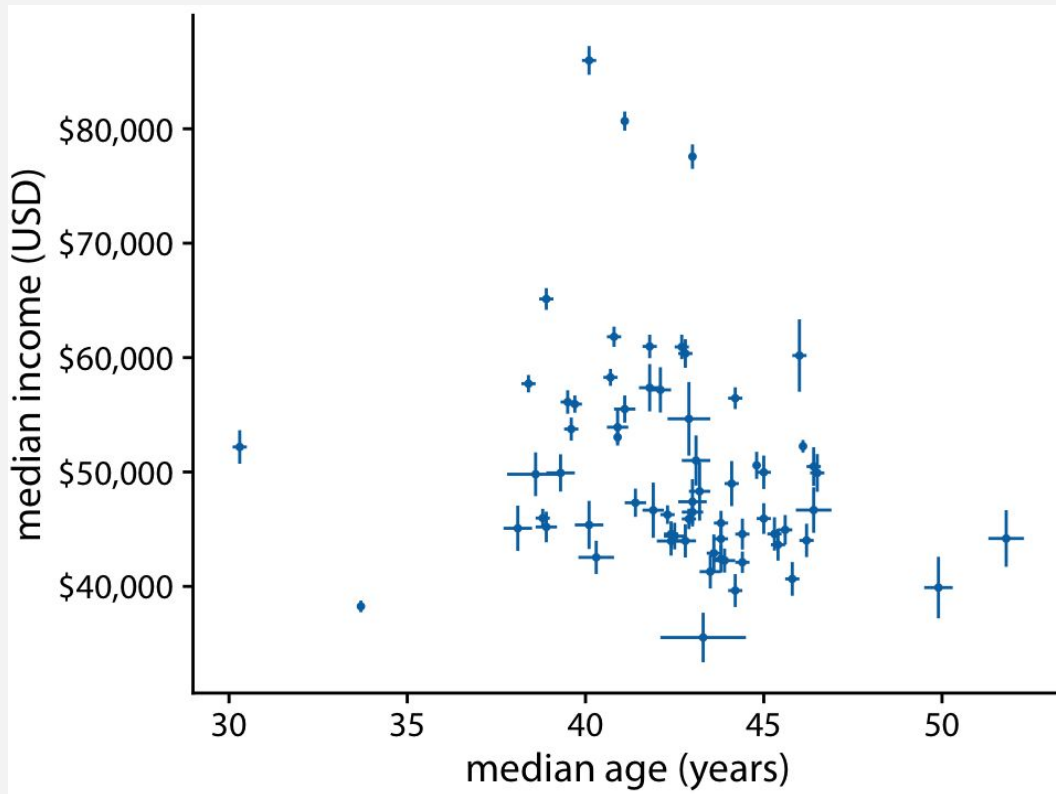


# Confidence Intervals



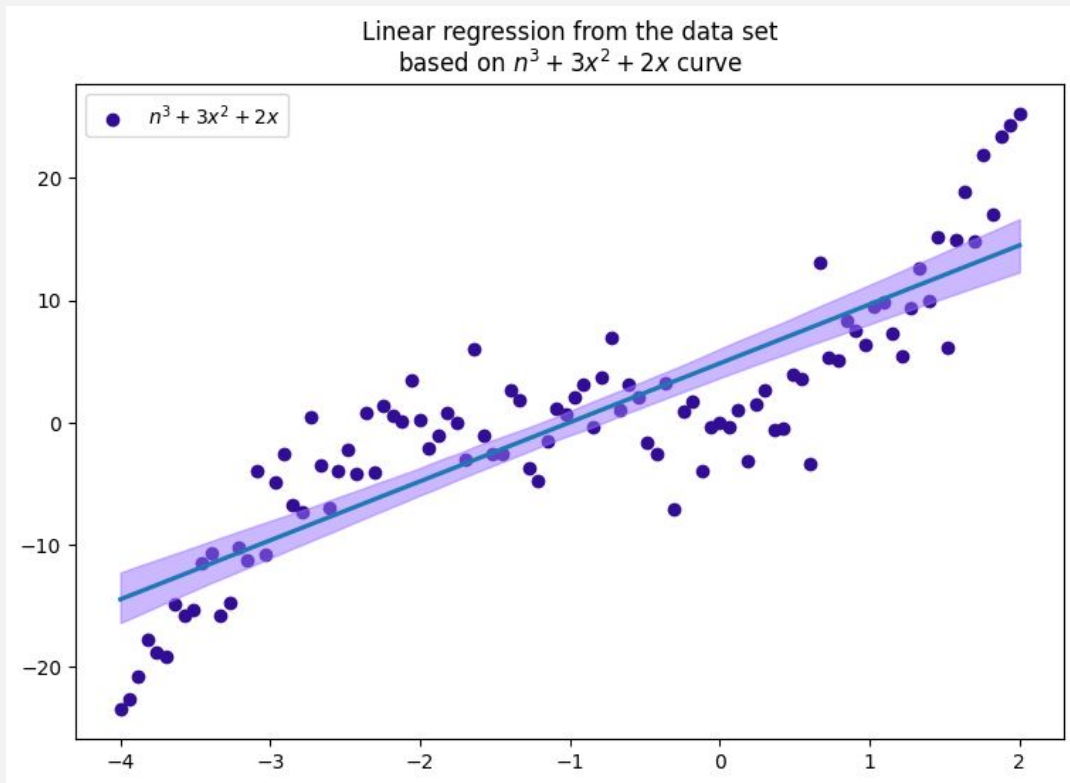


# Confidence Intervals



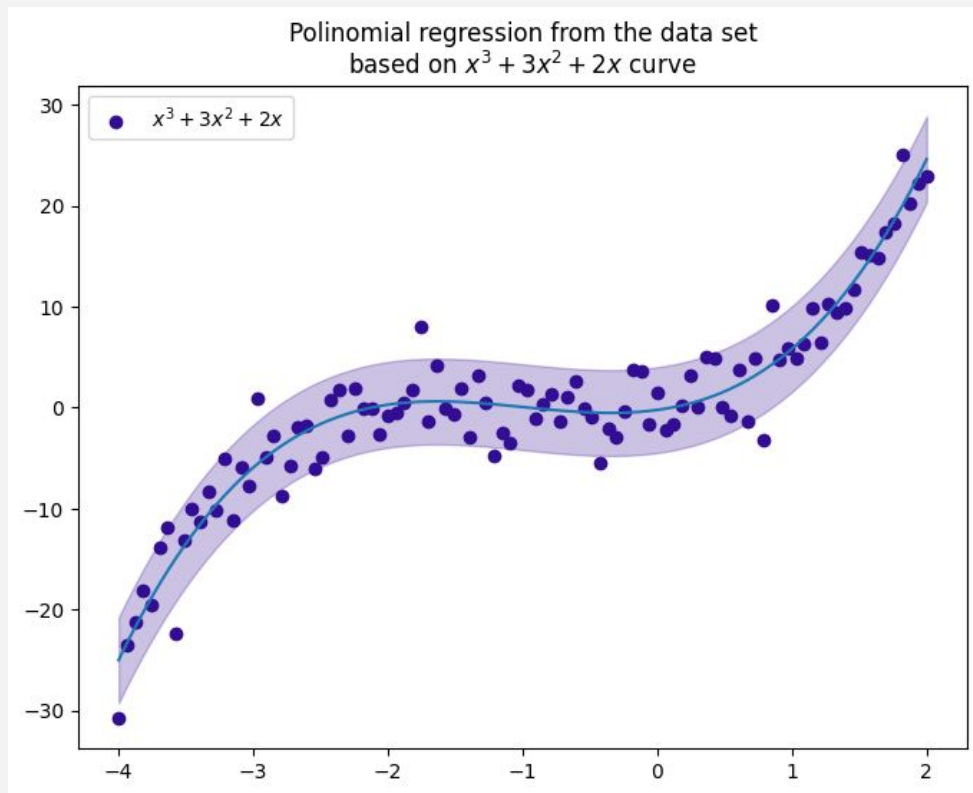


# Uncertainty range for linear regression





# Uncertainty range for polynomial regression





# Geospatial



# Ways of representing a map

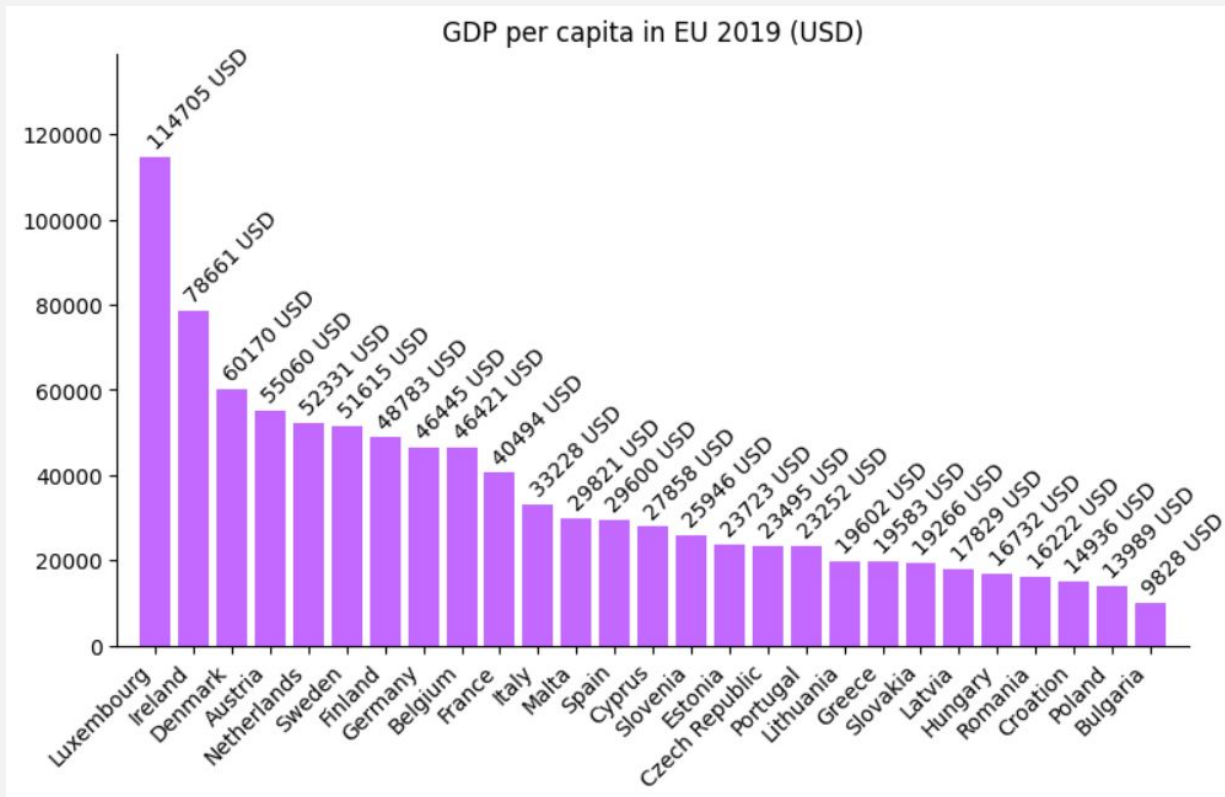


# Why we need maps?

|   | 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                |



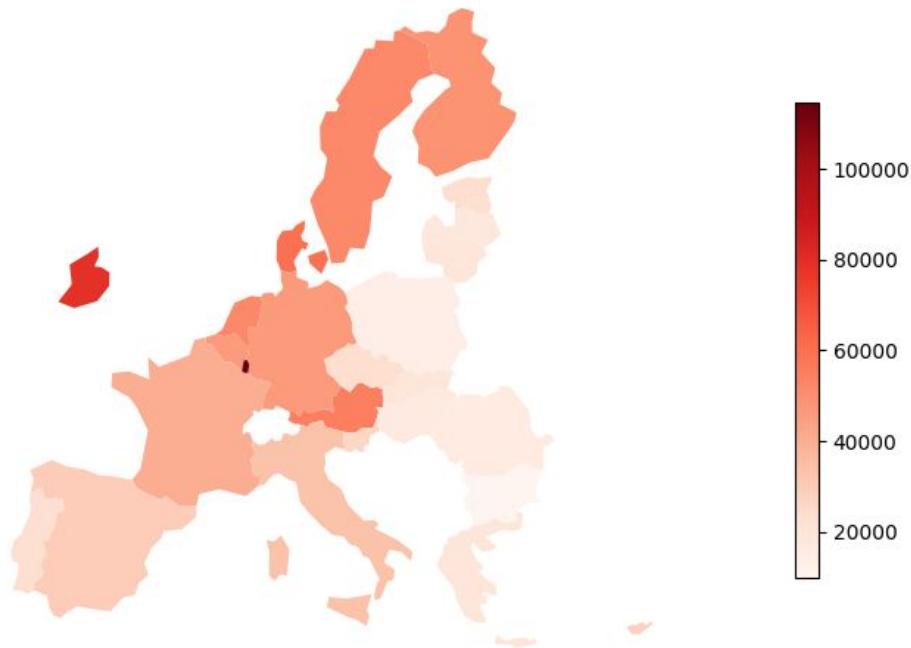
# Why we need maps?





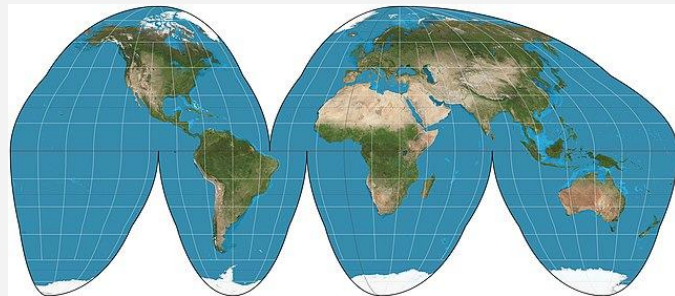
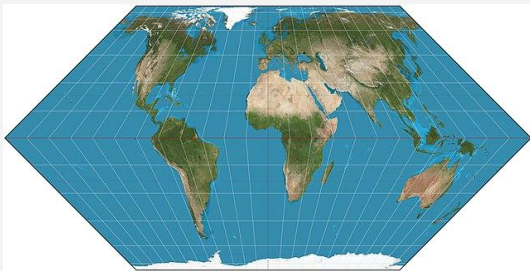
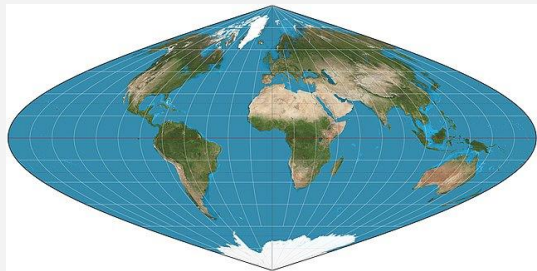
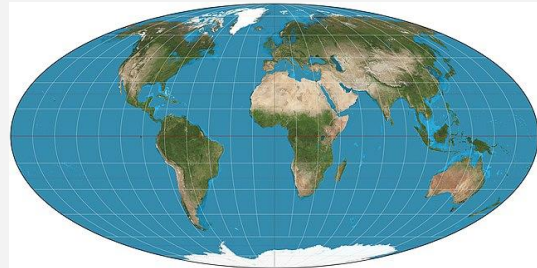
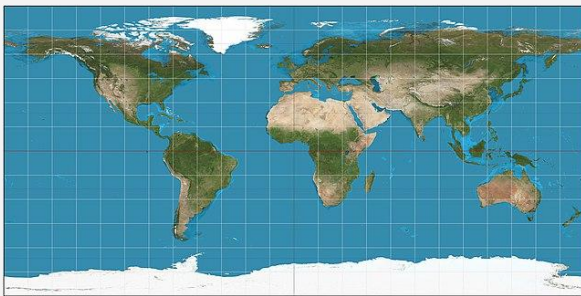
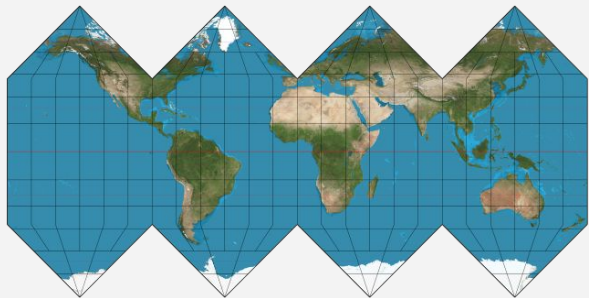
# Why we need maps?

GDP per capita in EU 2019 (USD)



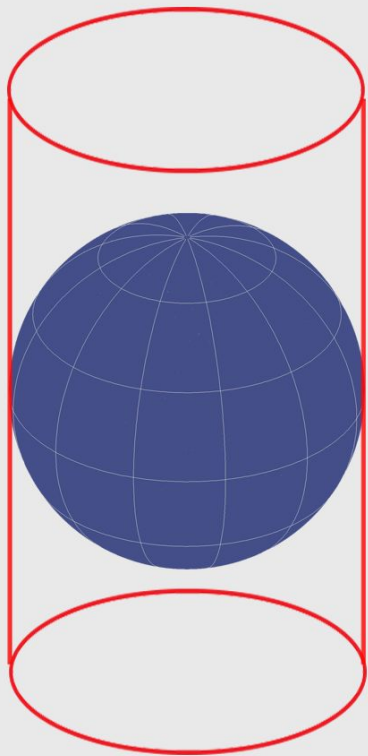


# Many, many different projections...

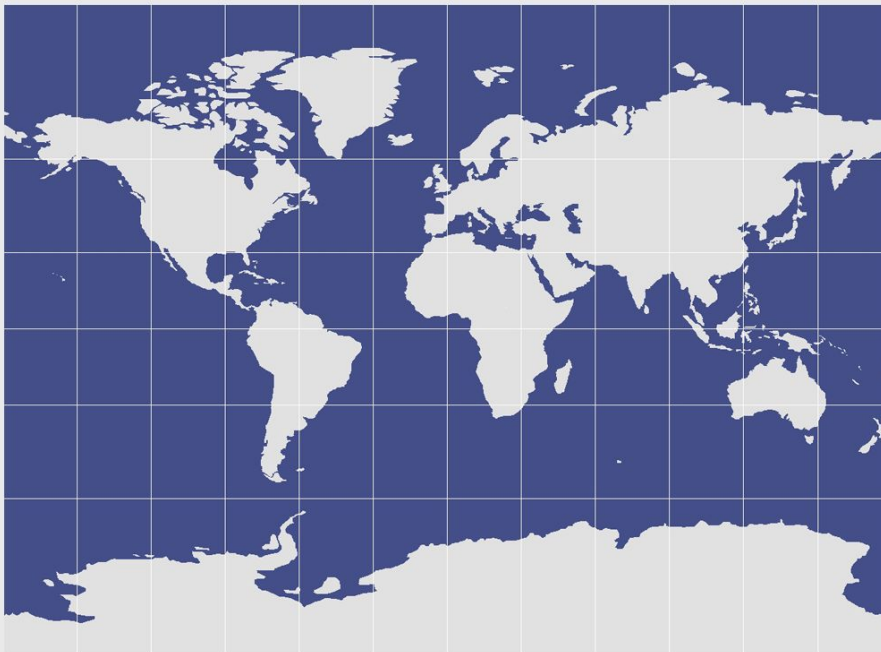




# Mercator projection

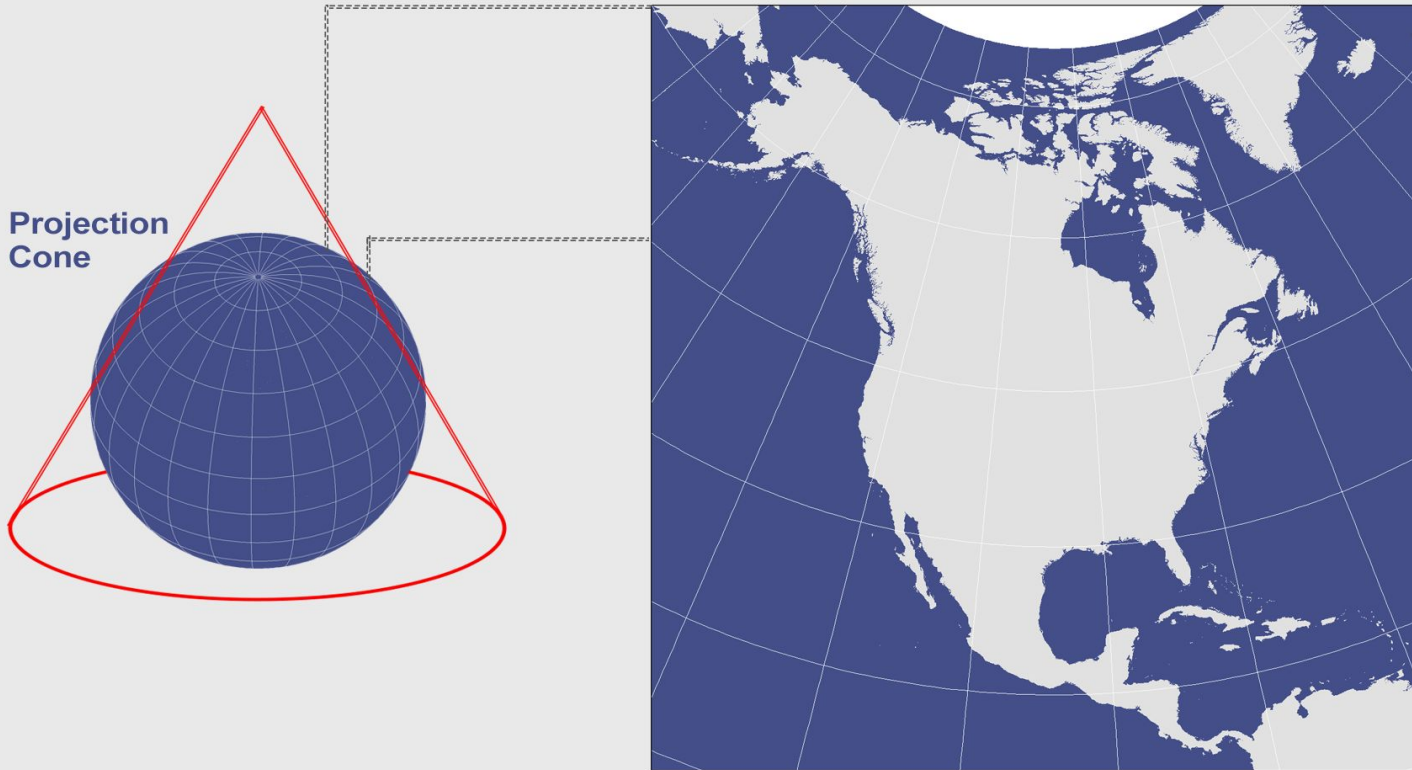


Projection  
Cylinder





# Albers projection





# Mercator projection



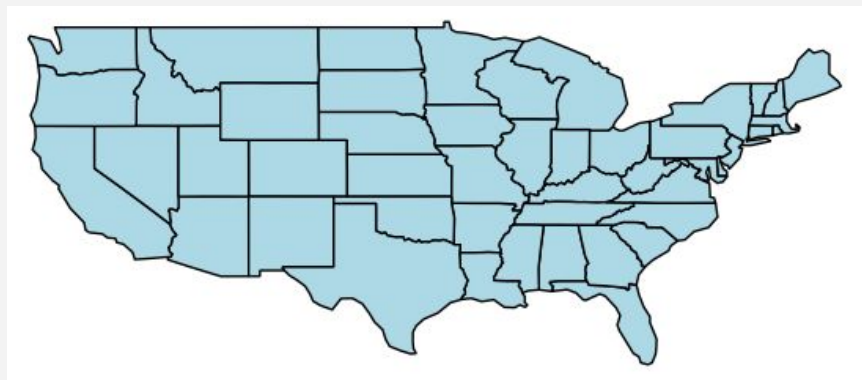


# Albers projection





# Mercator vs. Albers projection comparison

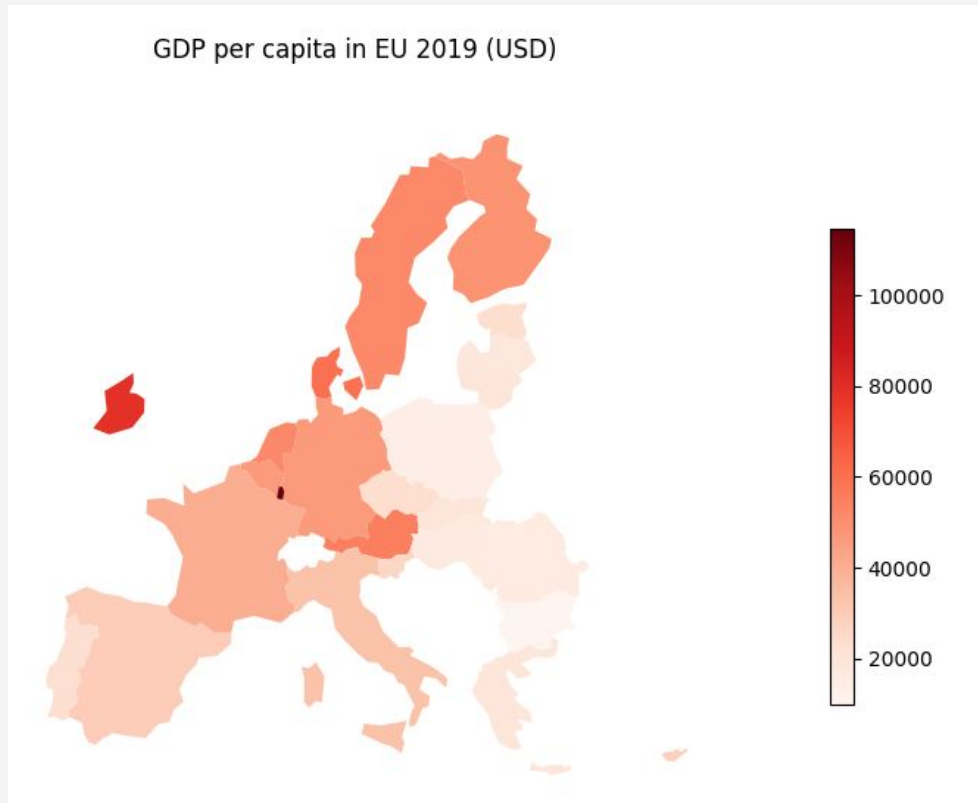




# Types of map visualizations

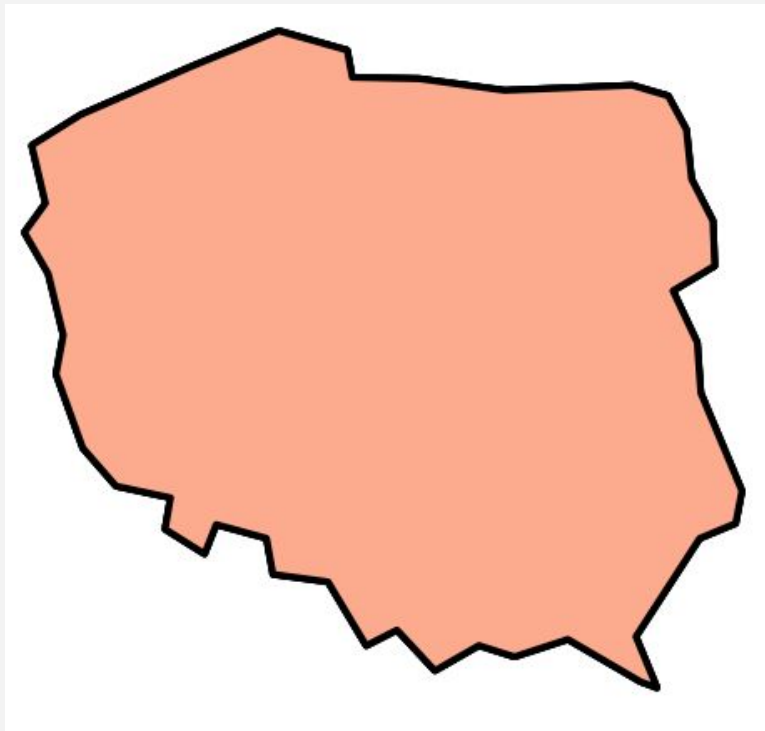


# Choropleth



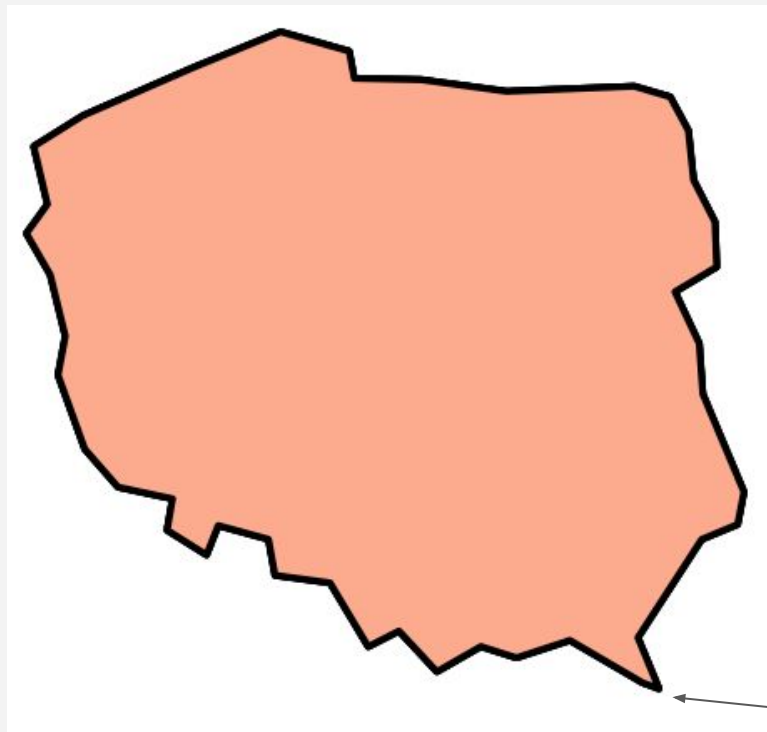


# Choropleth





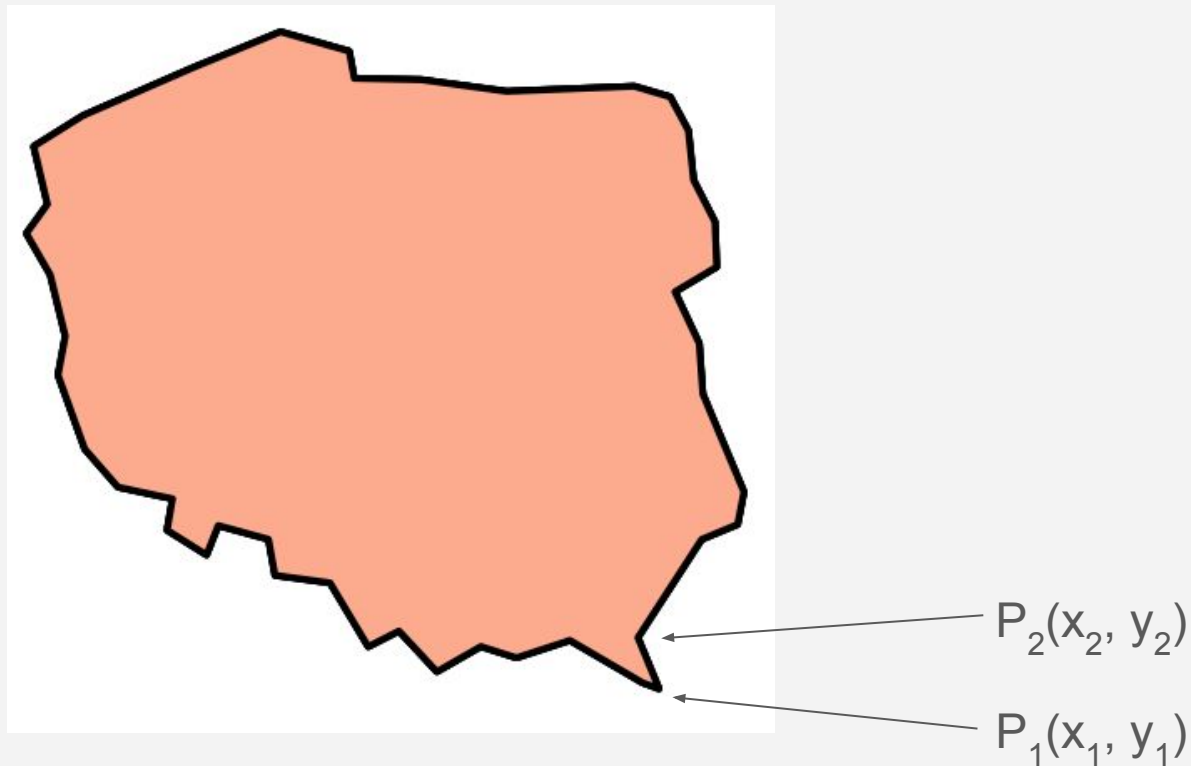
# Choropleth



$P_1(x_1, y_1)$

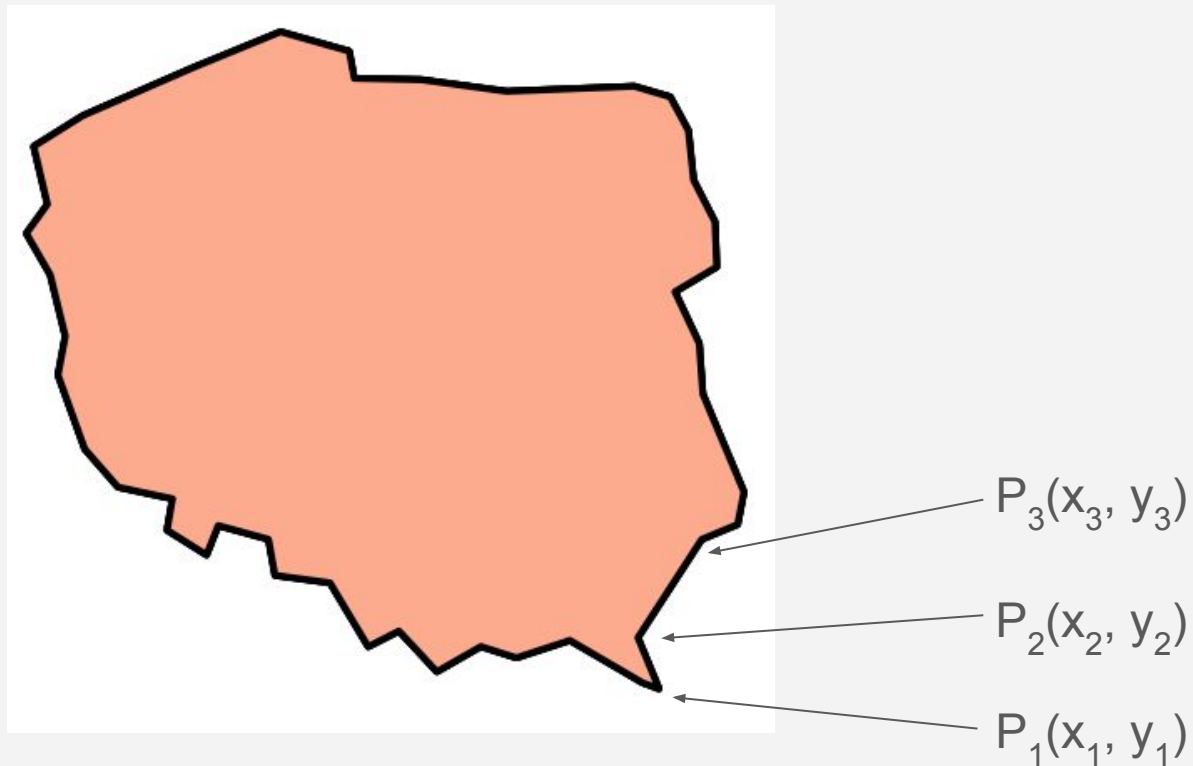


# Choropleth



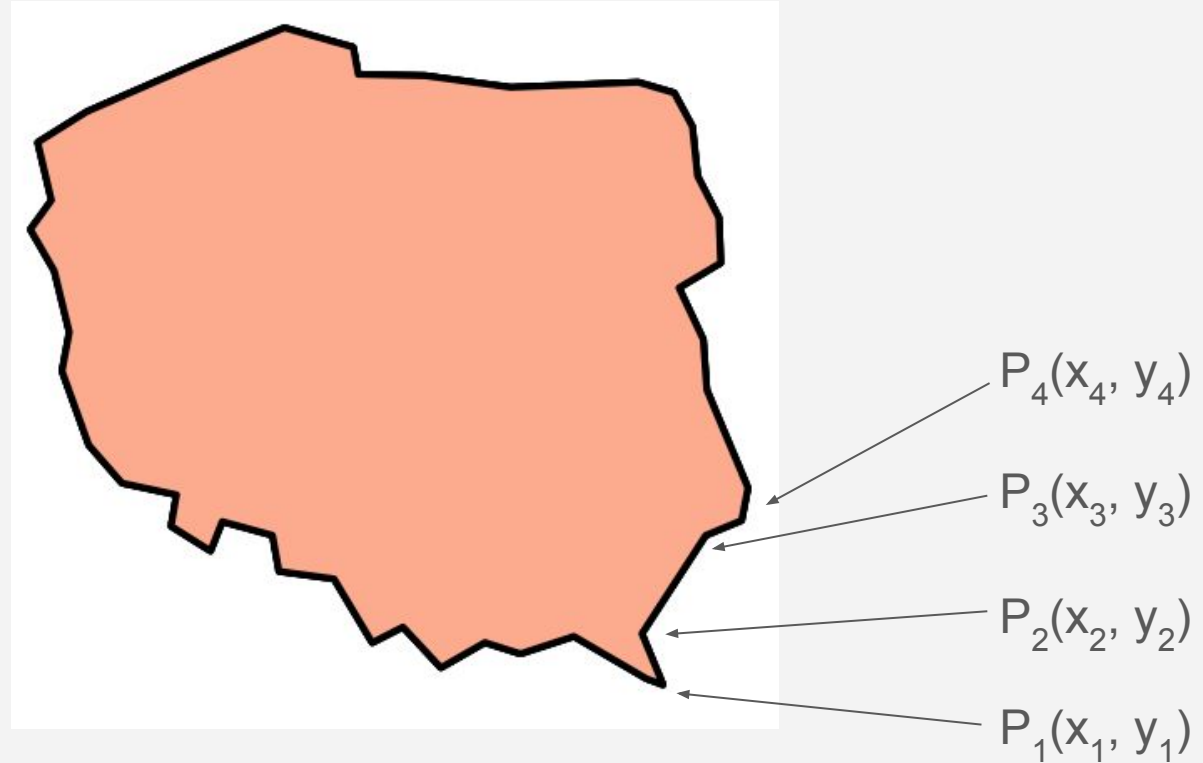


# Choropleth





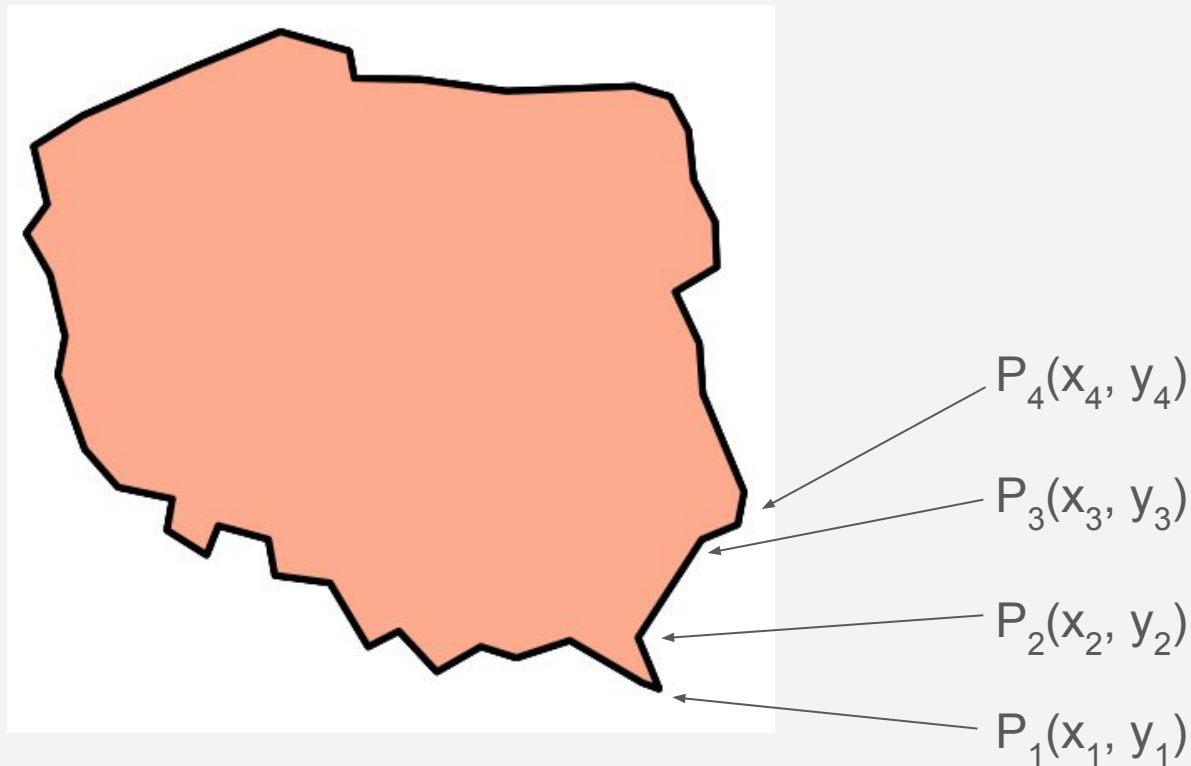
# Choropleth





# Choropleth

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



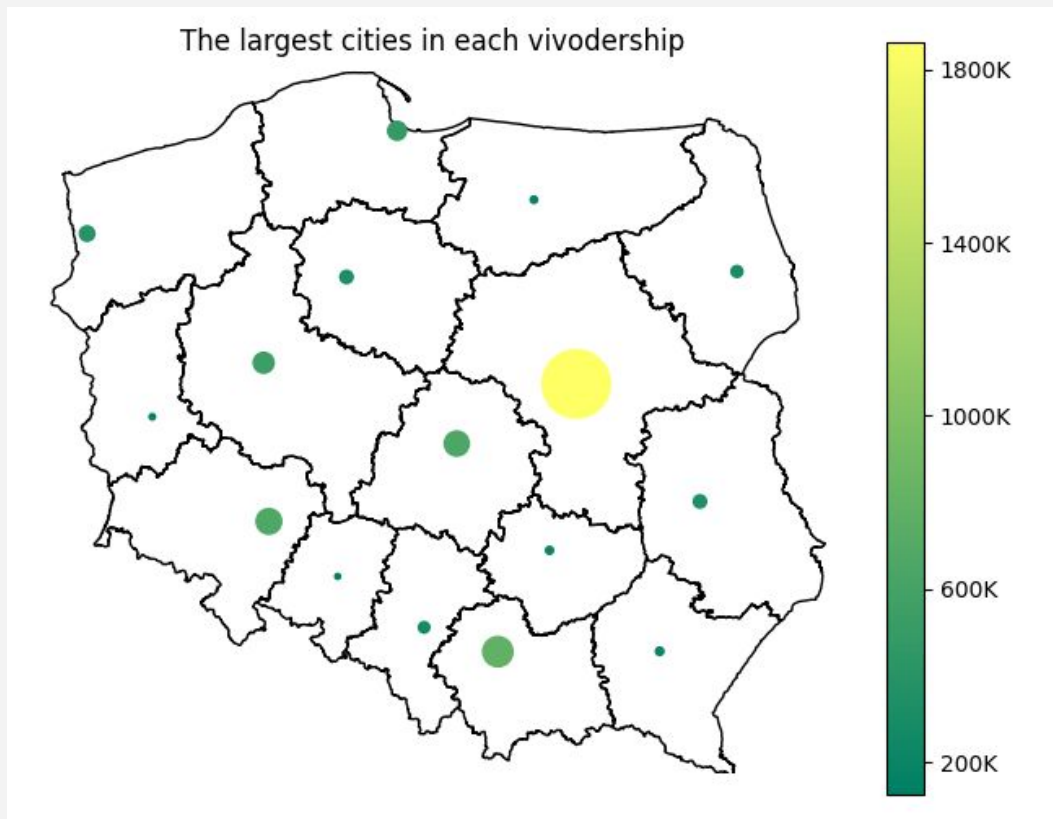


# GeoJSON

```
{
  "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"
    },
    ...
  ]
}
```

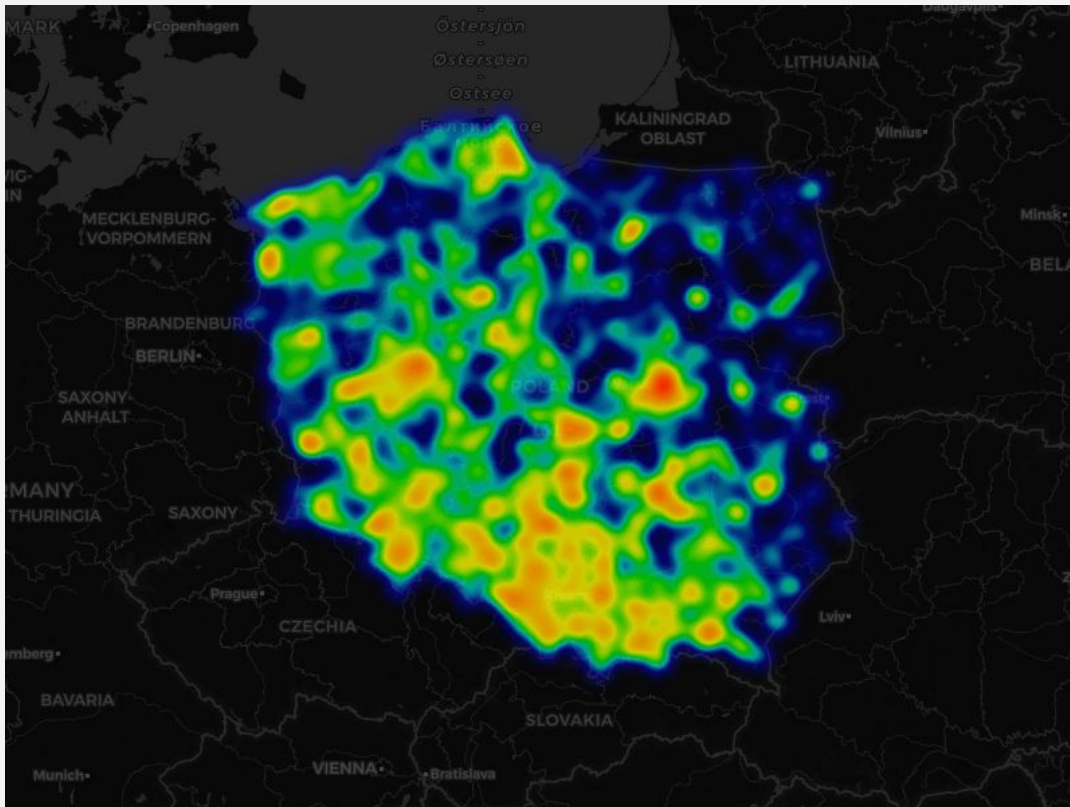


# Bubble graph on map



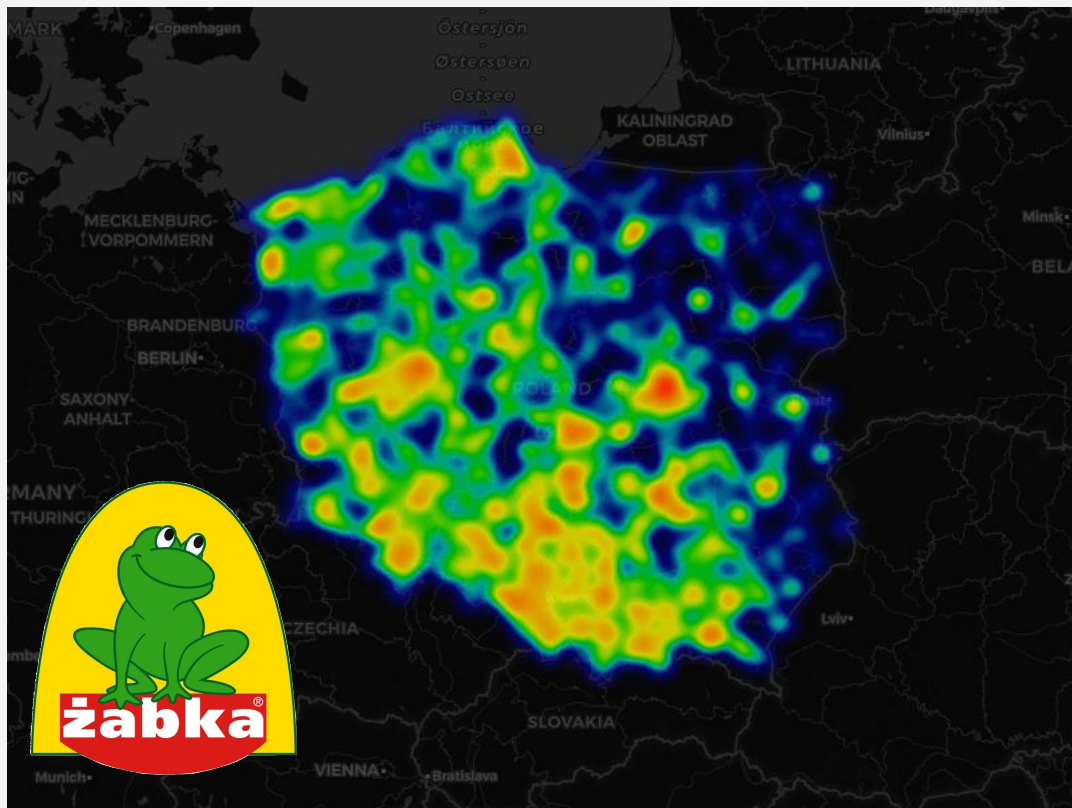


# Cartogram heatmap





# 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](#)
- 