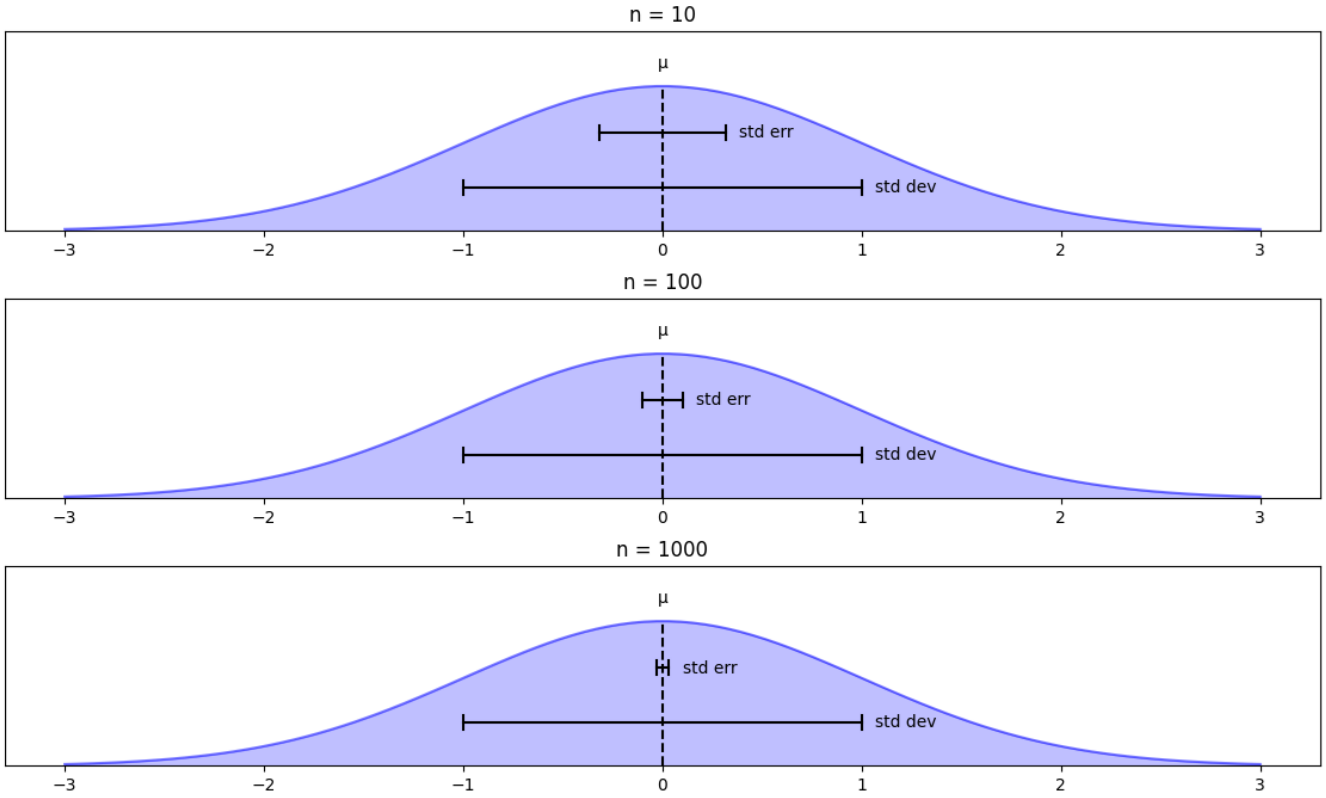
Data Visualizations

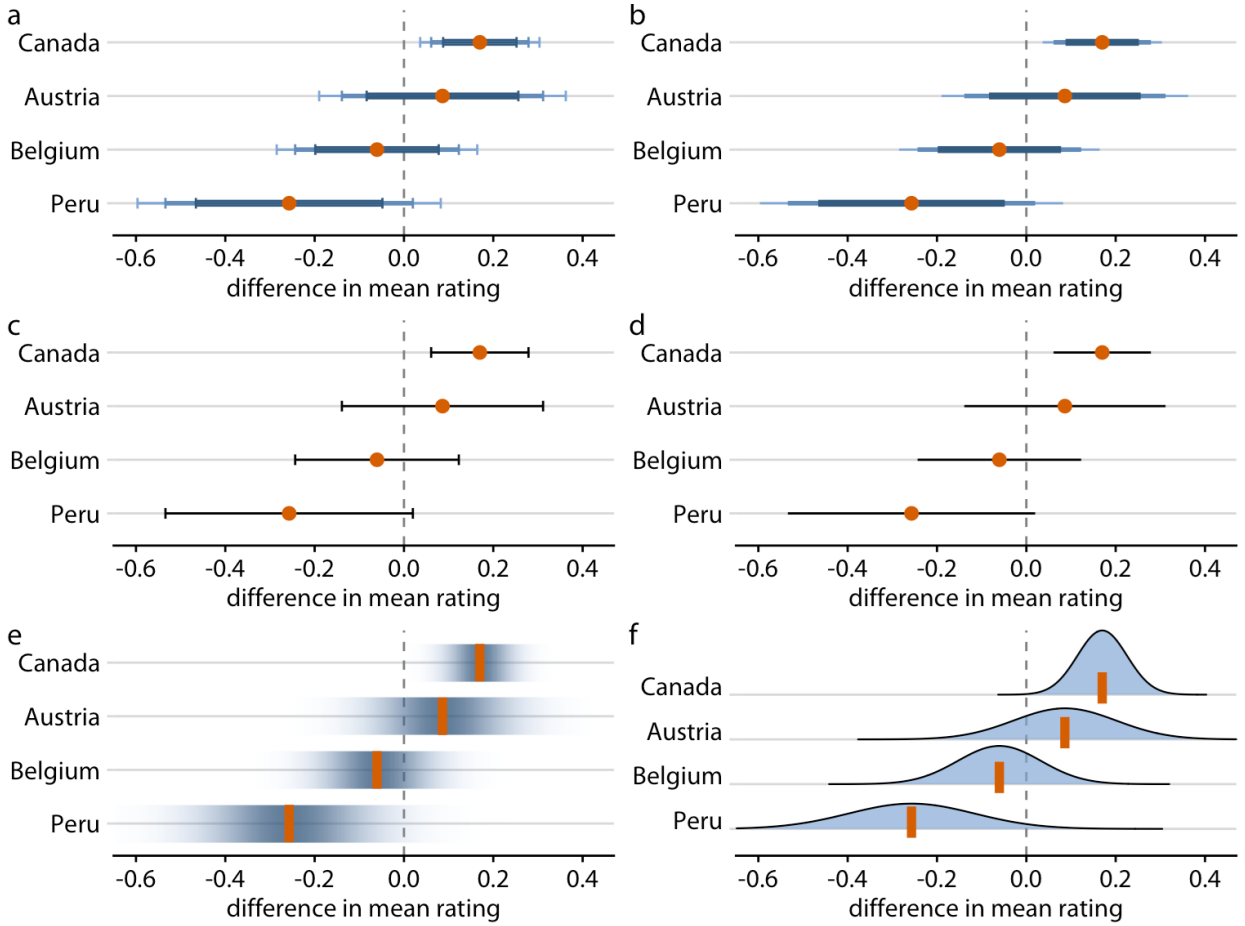
Uncertainty

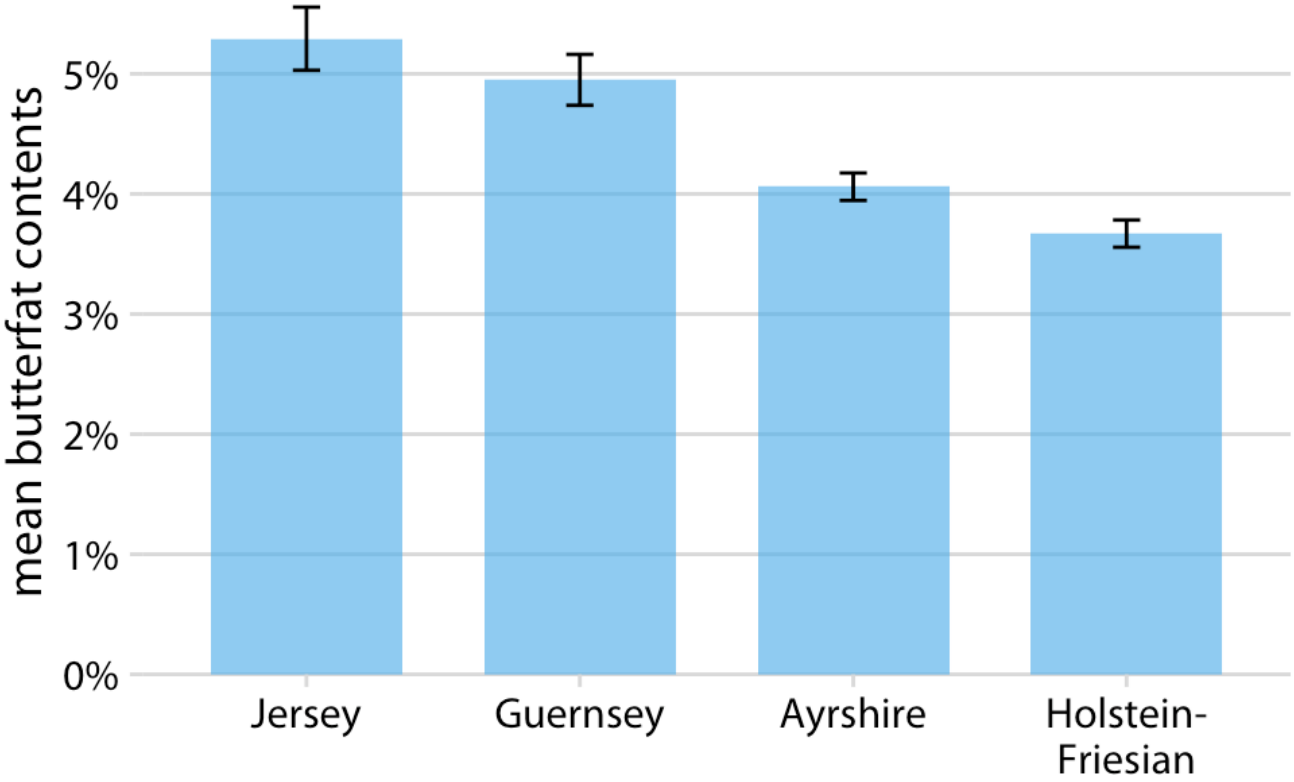
Standard error

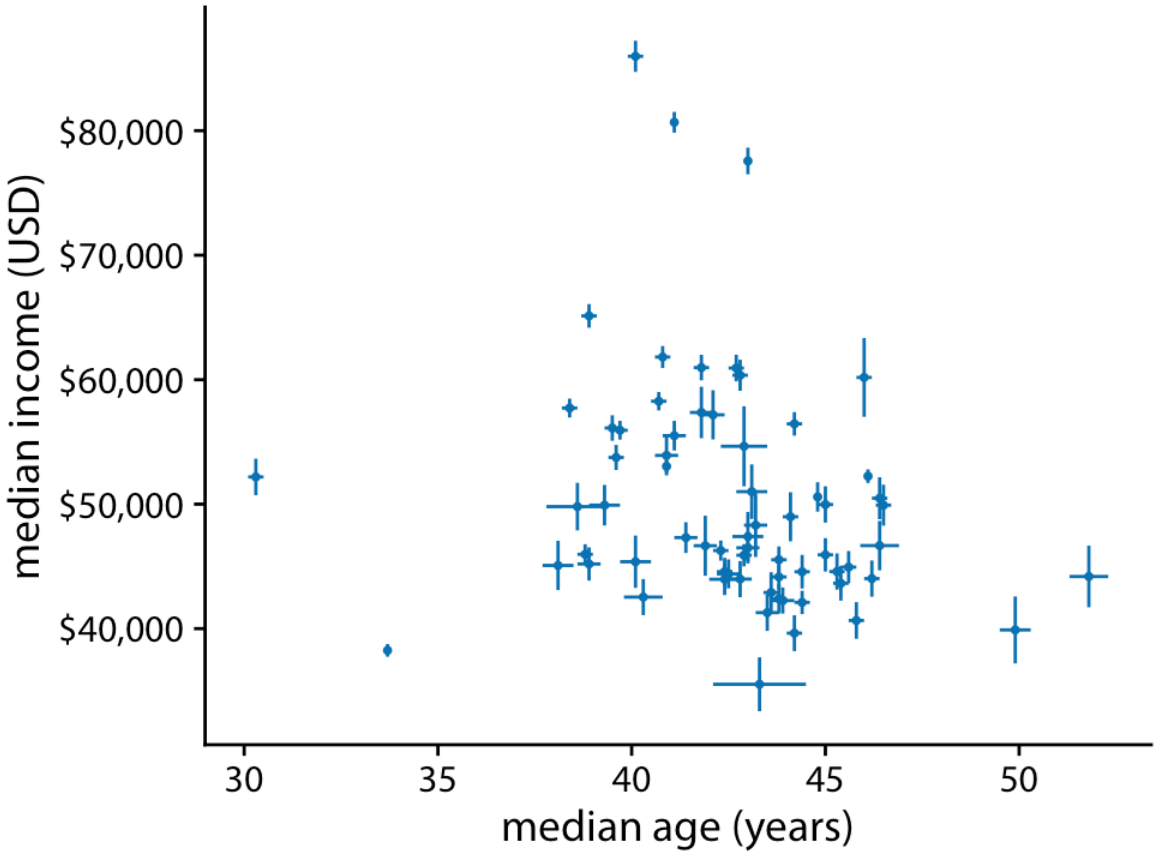
$$SE = \frac{\sigma}{\sqrt{n}} \qquad CI = \bar{x} \pm z\frac{\sigma}{\sqrt{n}}$$

Standard error

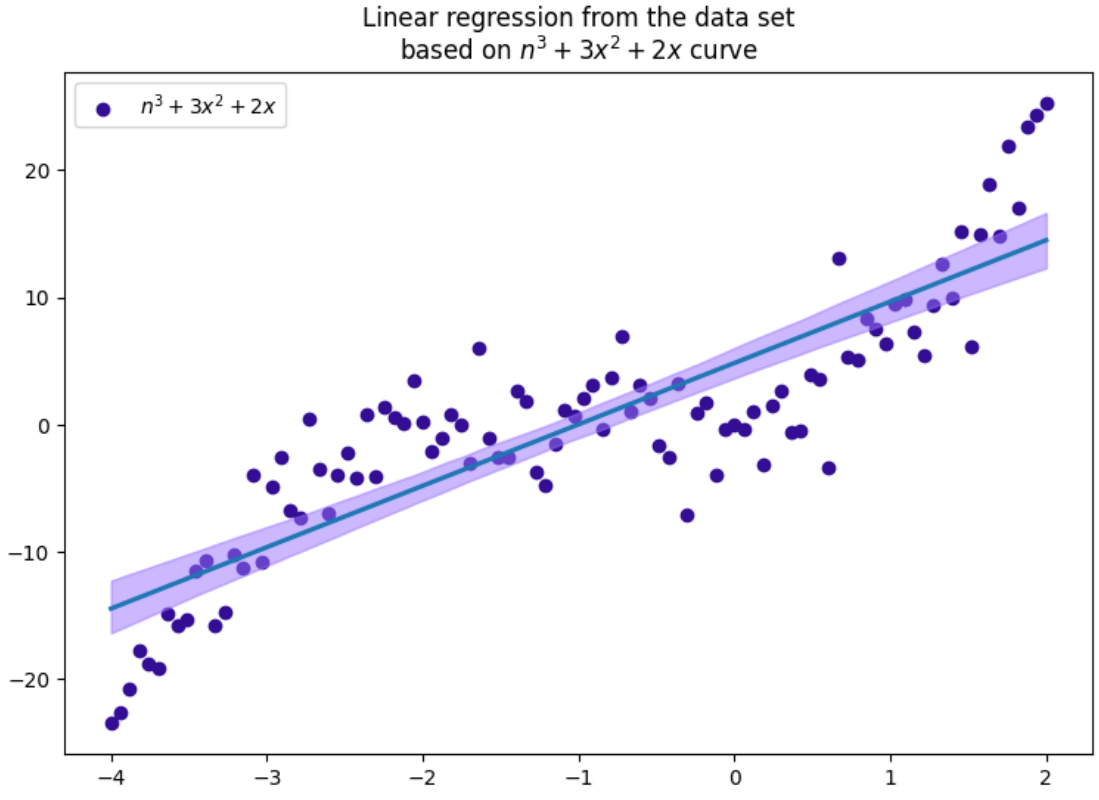



a
Canada
Austria
Belgium
Peru
-0.6
-0.4
-0.2
0.0
0.2
0.4
difference in mean rating
b
Canada
Austria
Belgium
Peru
-0.6
-0.4
-0.2
0.0
0.2
0.4
difference in mean rating
c
Canada
Austria
Belgium
Peru
-0.6
-0.4
-0.2
0.0
0.2
0.4
difference in mean rating
d
Canada
Austria
Belgium
Peru
-0.6
-0.4
-0.2
0.0
0.2
0.4
difference in mean rating
e
Canada
Austria
Belgium
Peru
-0.6
-0.4
-0.2
0.0
0.2
0.4
difference in mean rating
f
Canada
Austria
Belgium
Peru
-0.6
-0.4
-0.2
0.0
0.2
0.4
difference in mean rating

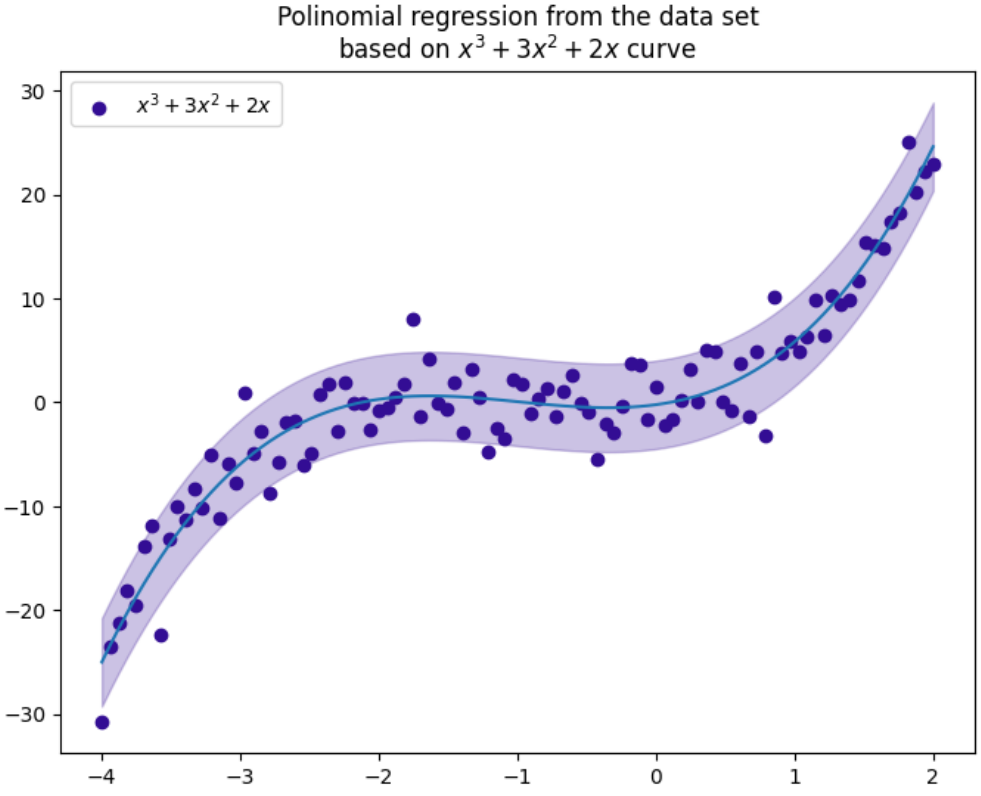

mean butterfat contents
5%
4%
3%
2%
1%
0%
Jersey
Guernsey
Ayrshire
Holstein-
Friesian


median income (USD)
$80,000
$70,000
$60,000
$50,000
$40,000
30
35
40
45
50
median age (years)

Uncertainty range for linear regression



Uncertainty range for polynomial regression

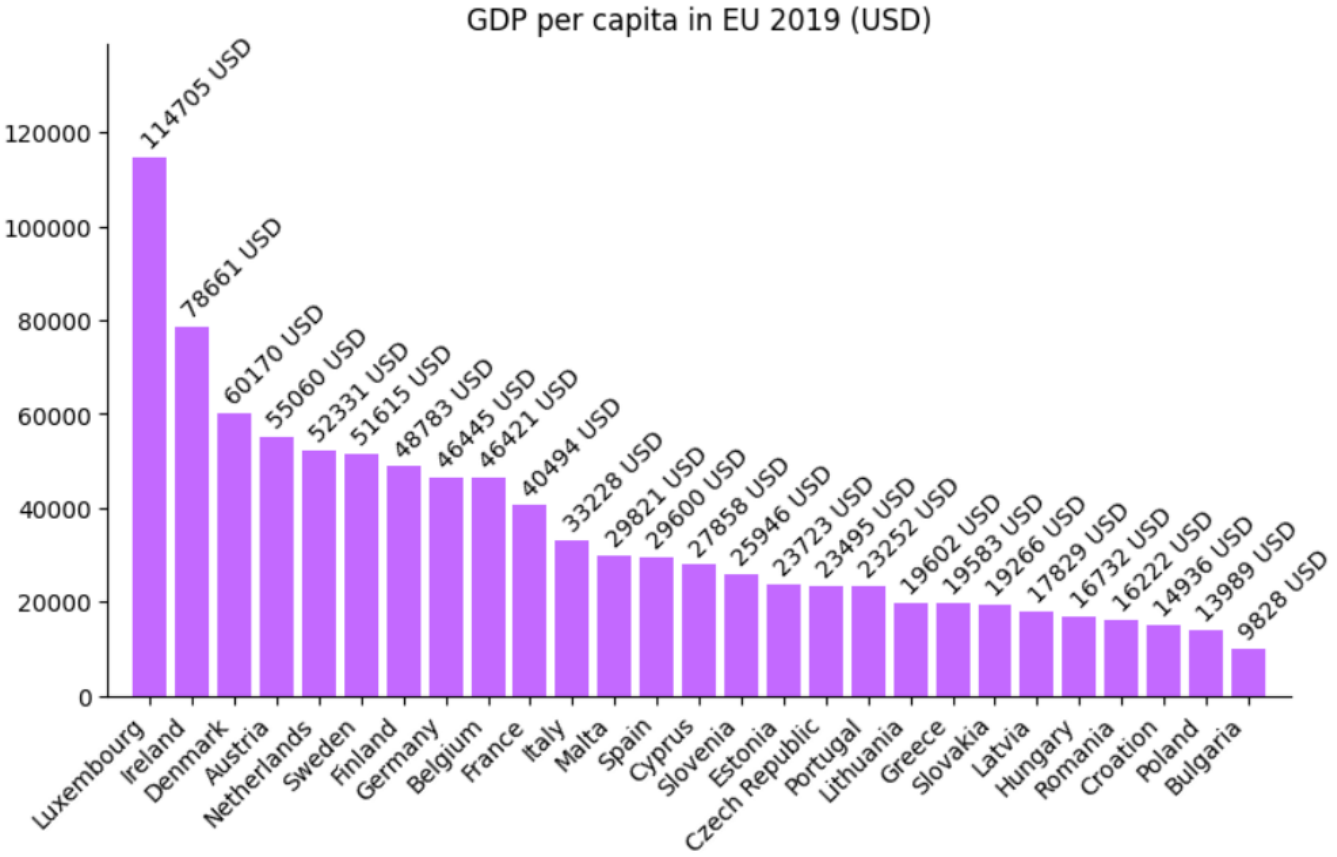


Geospatial

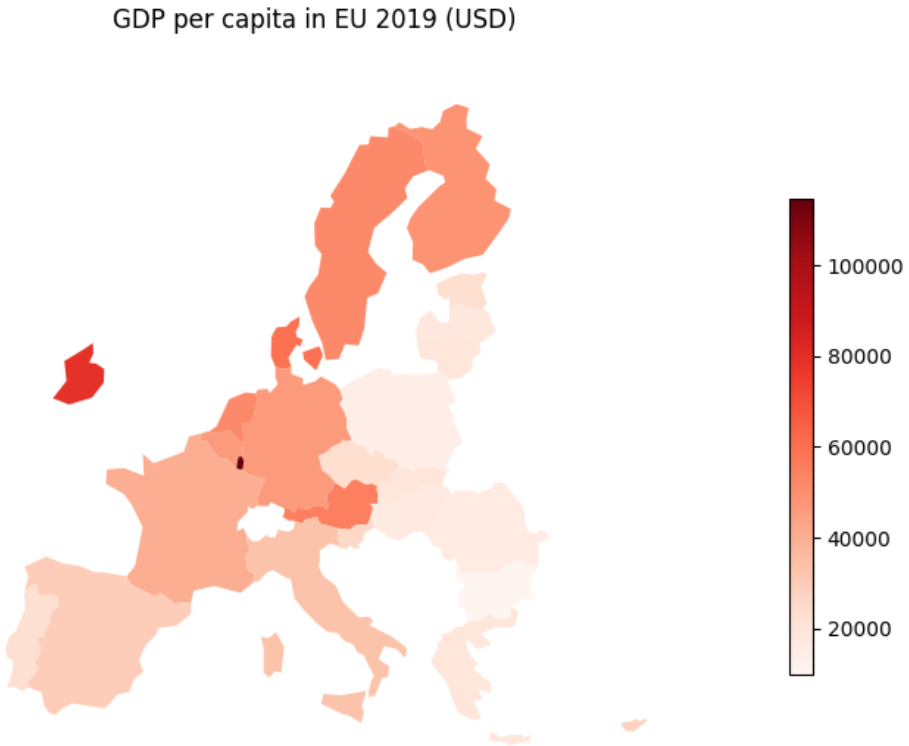
Why we need maps?

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

Why we need maps?

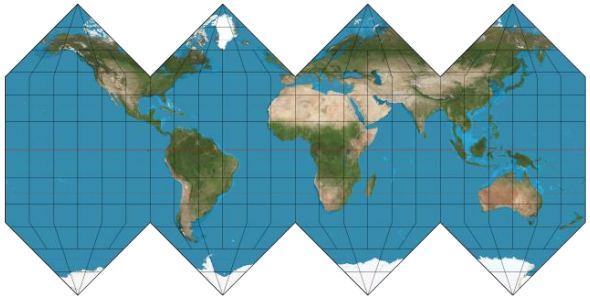


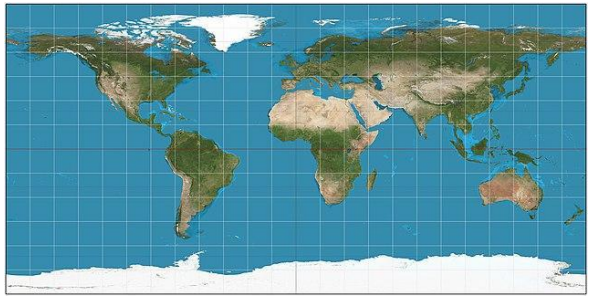
Why we need maps?

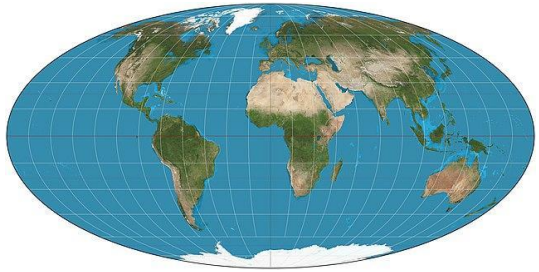


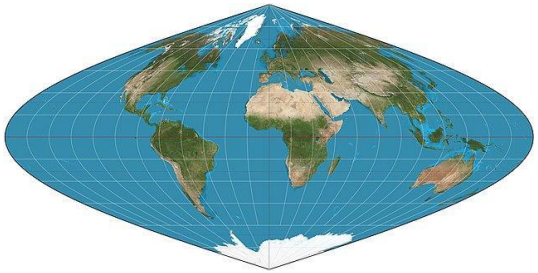
Ways of representing a map

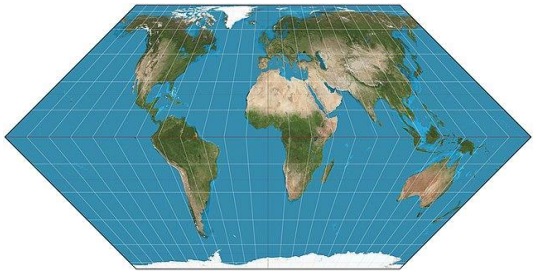
Many, many different projections…

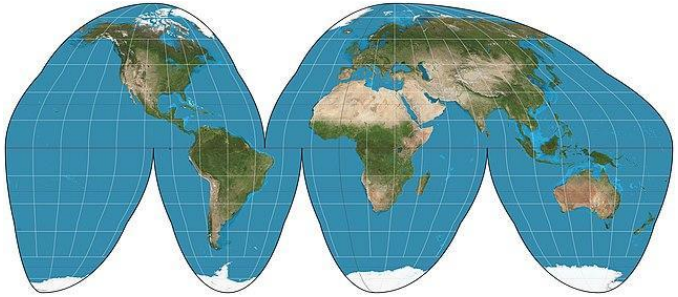




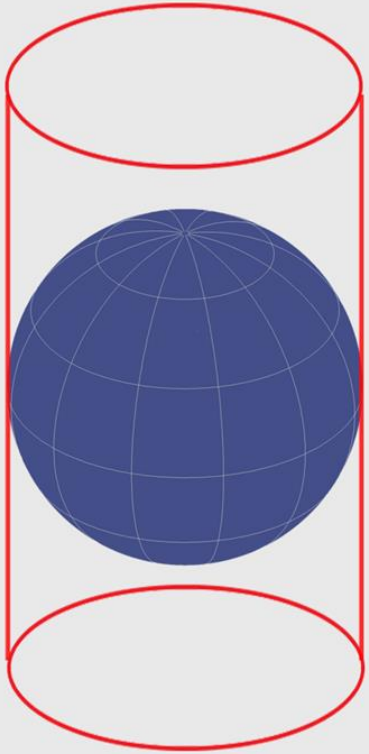




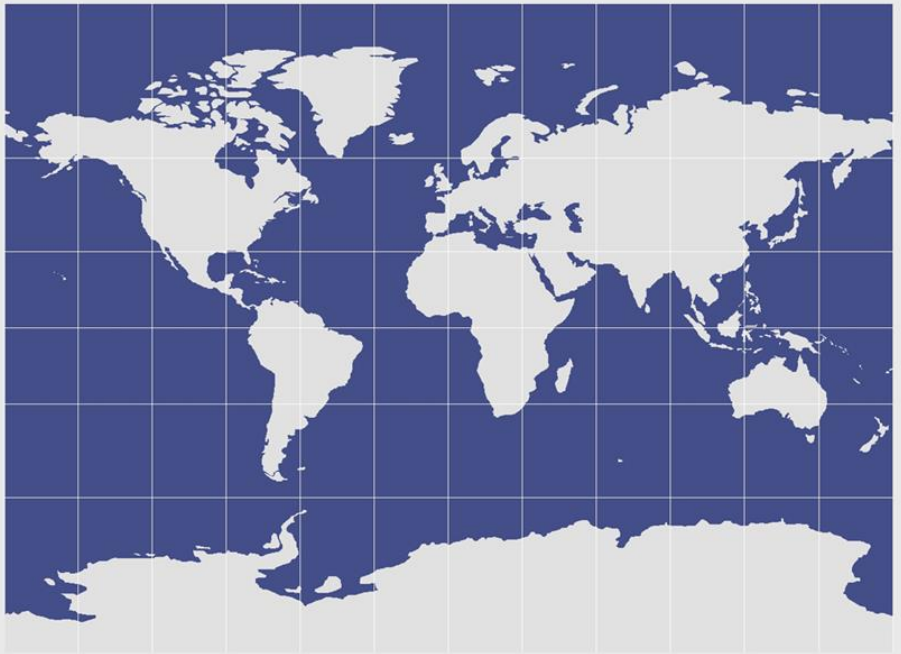




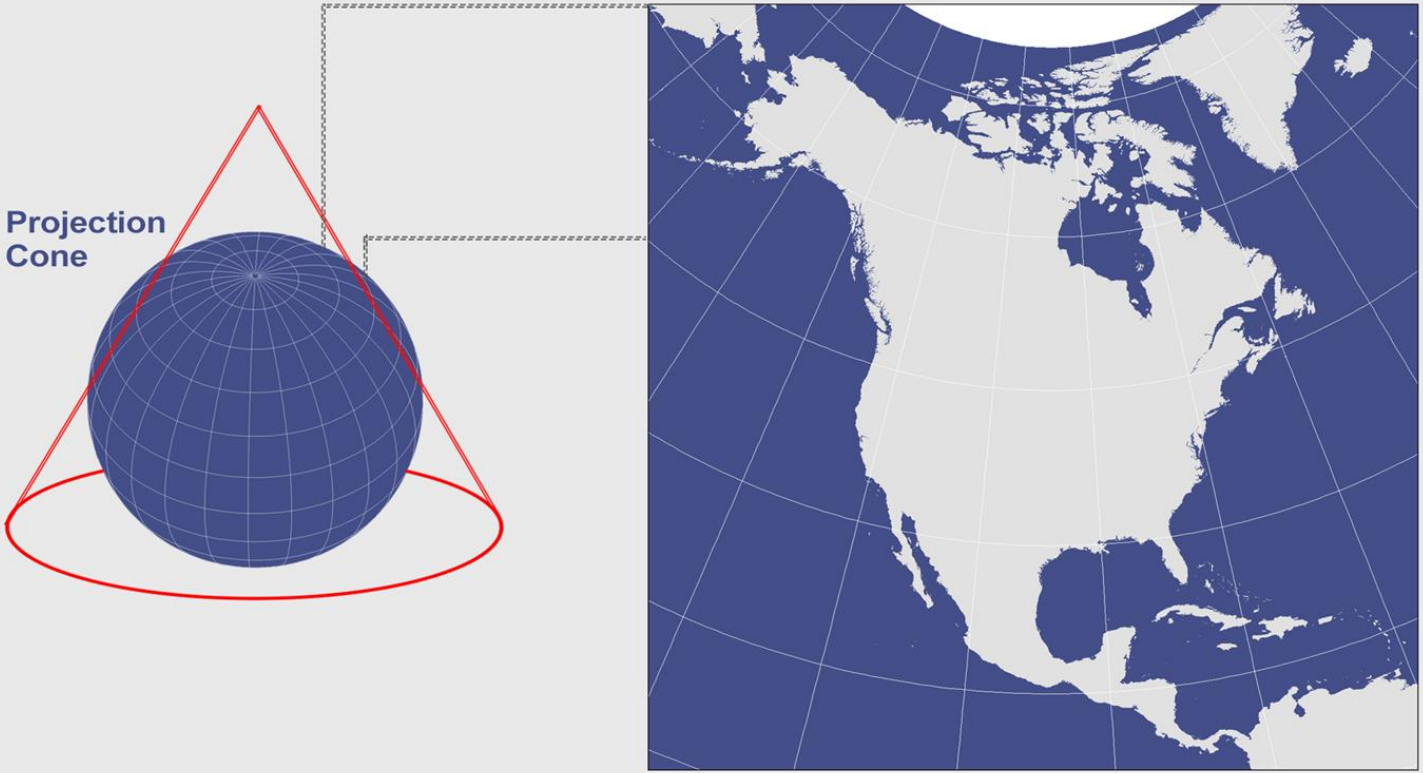
Mercator projection



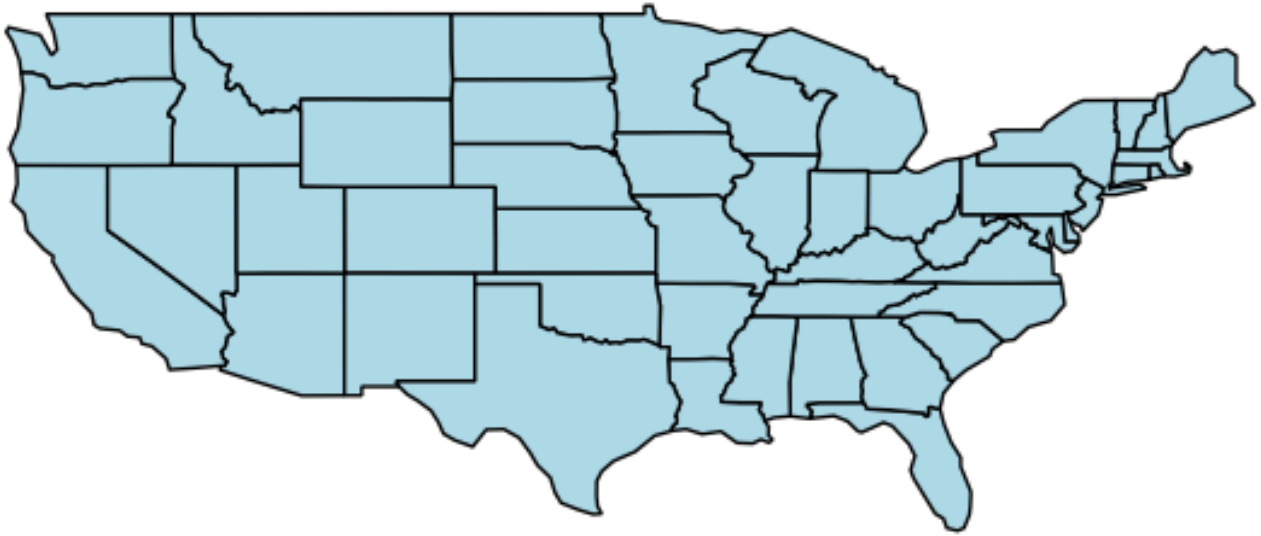
Projection
Cylinder



Albers projection



Mercator projection

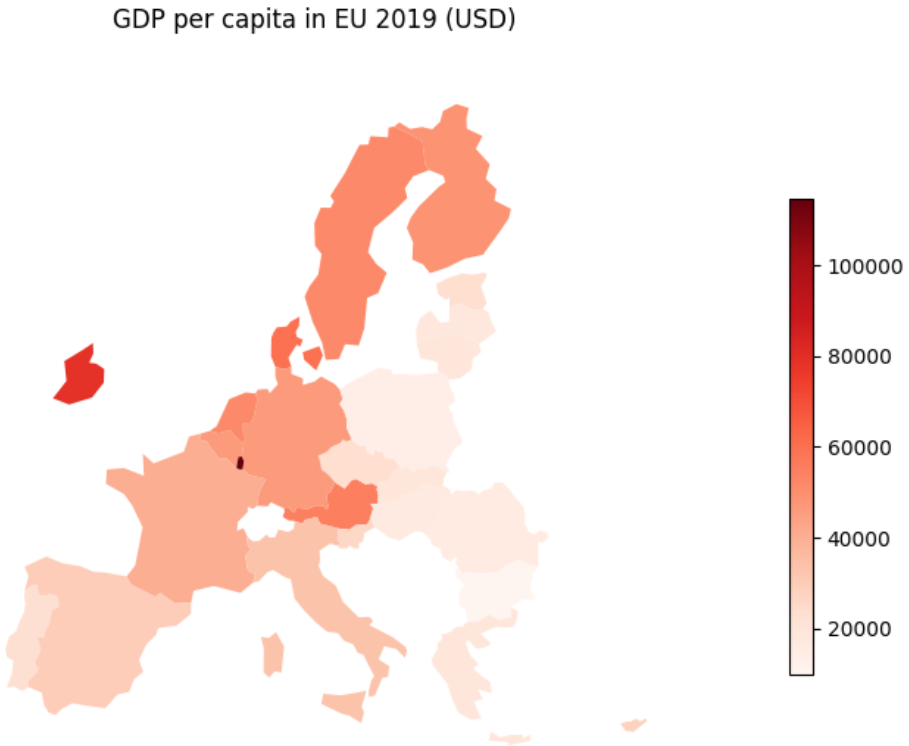


Albers projection

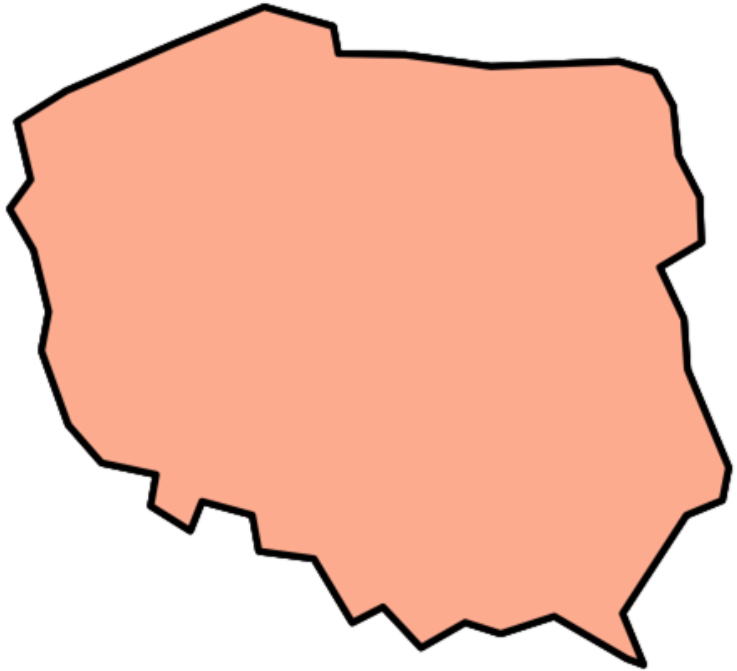
Mercator vs. Albers projection comparison

Types of map visualizations

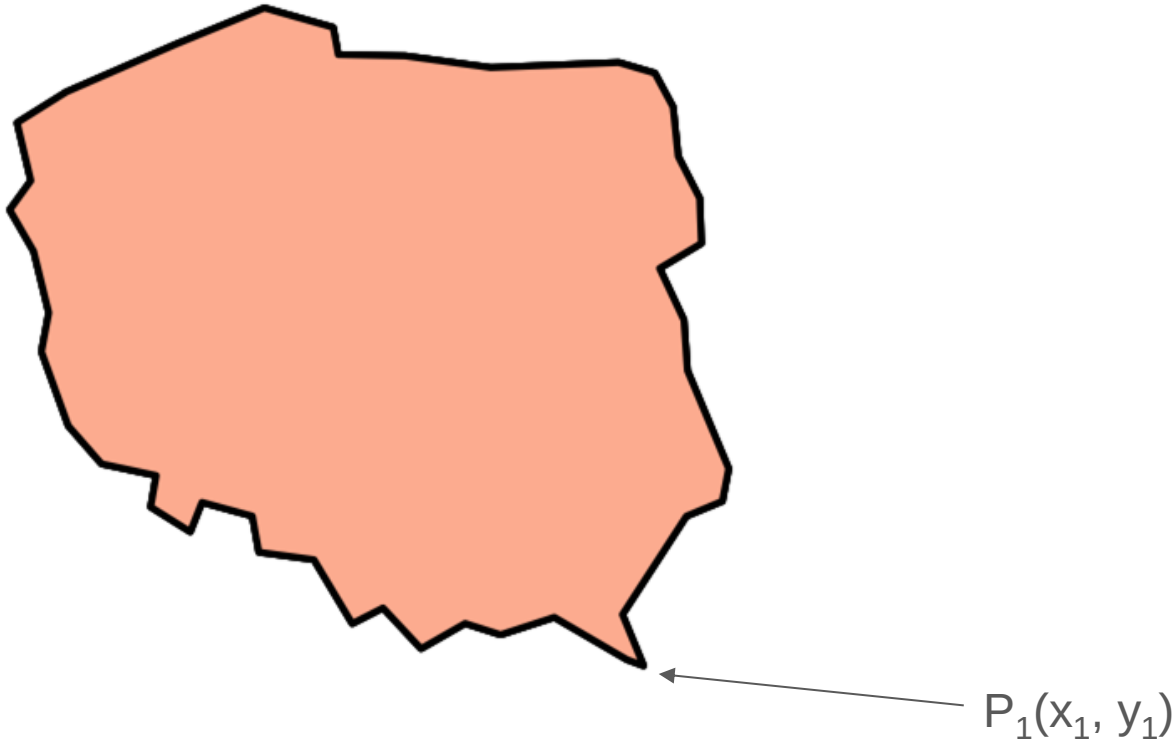
Choropleth



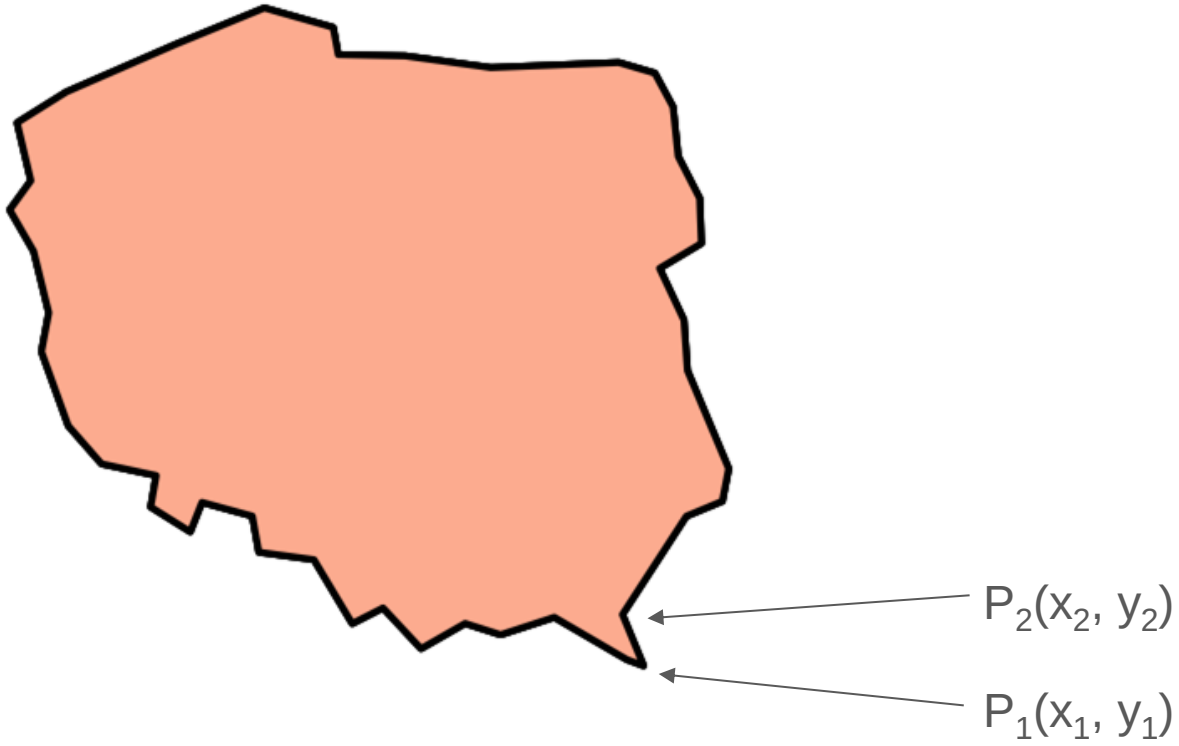
Choropleth



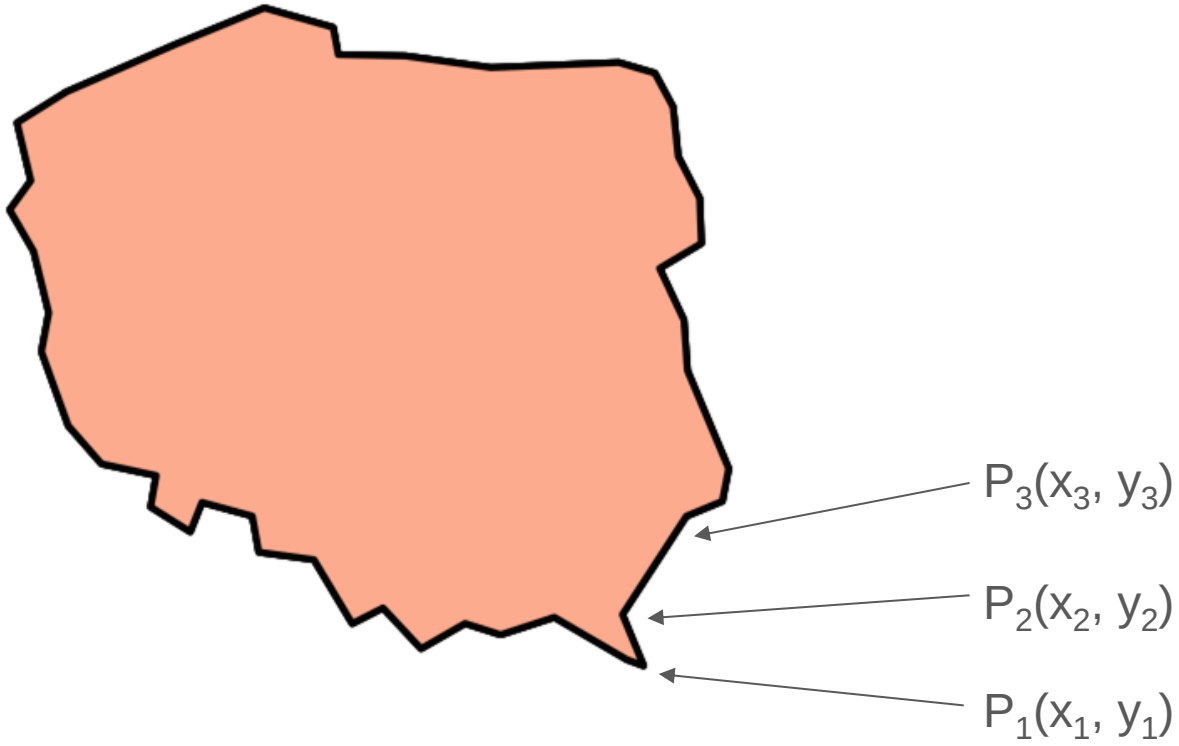
Choropleth



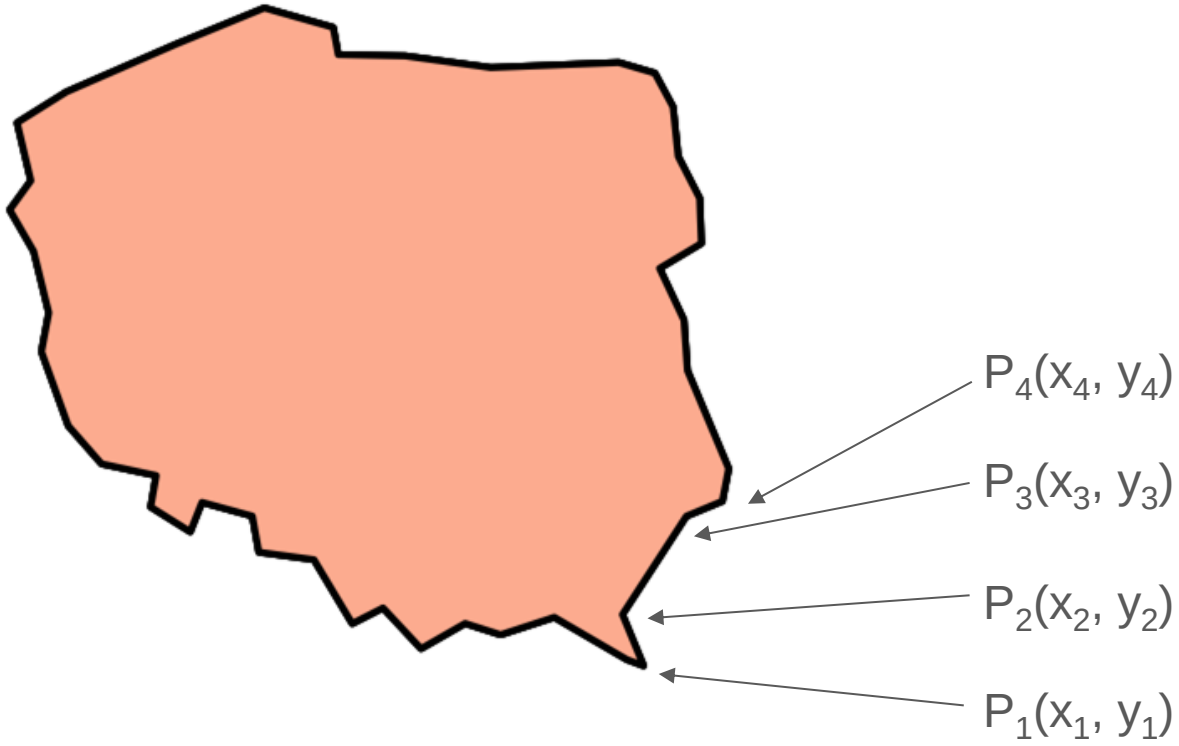
Choropleth



Choropleth

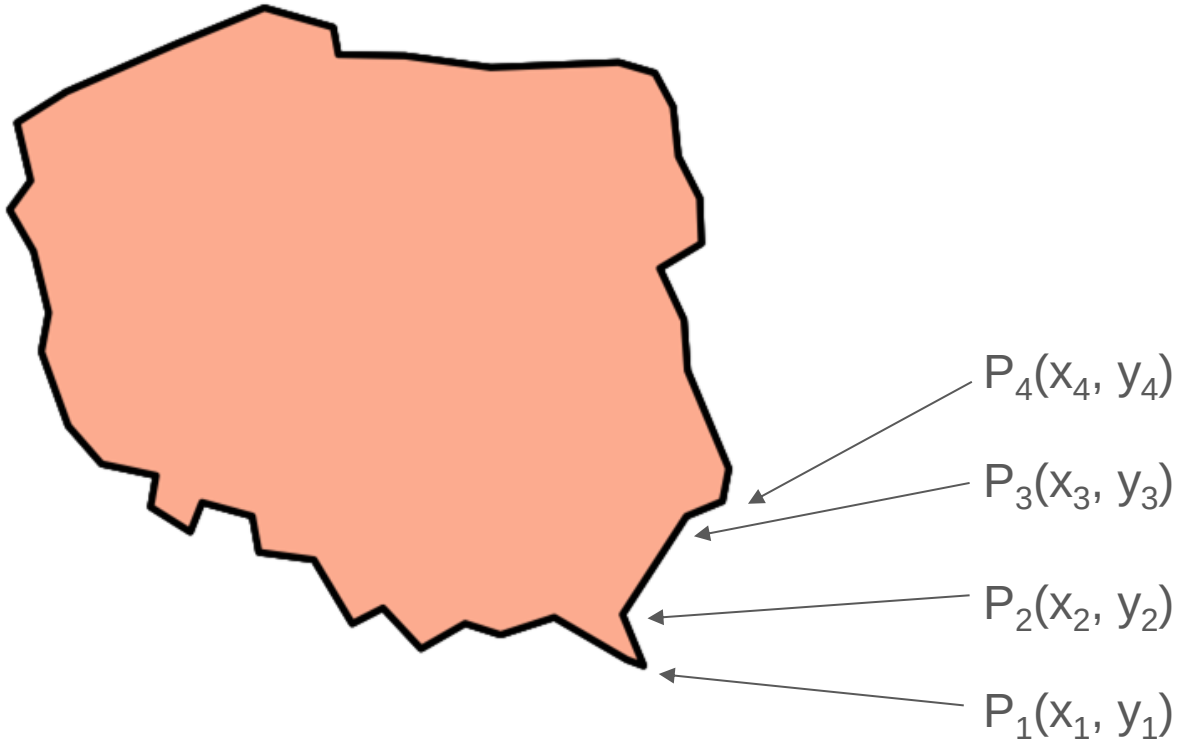


Choropleth



Choropleth

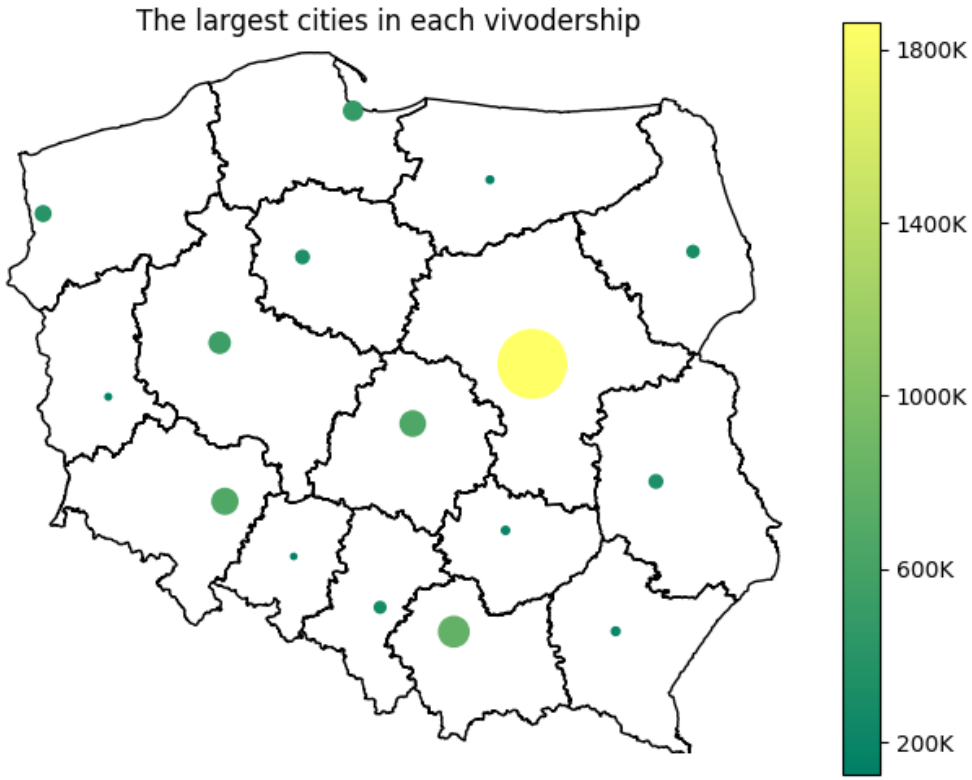
Poland = [
$P_1(x_1, y_1)$,
$P_2(x_2, y_2)$,
…,
$P_n(x_n, y_n)$
]



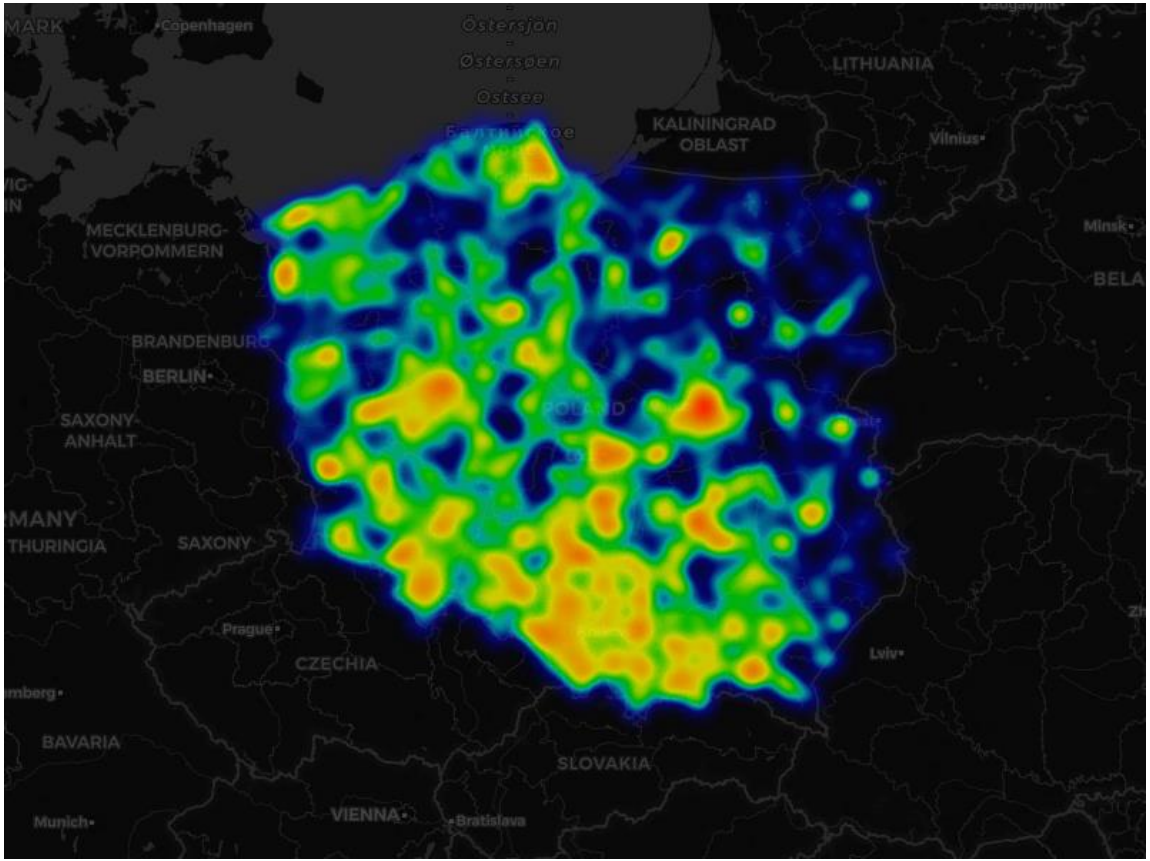
GeoJSON


{
"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"
},
...
]
}

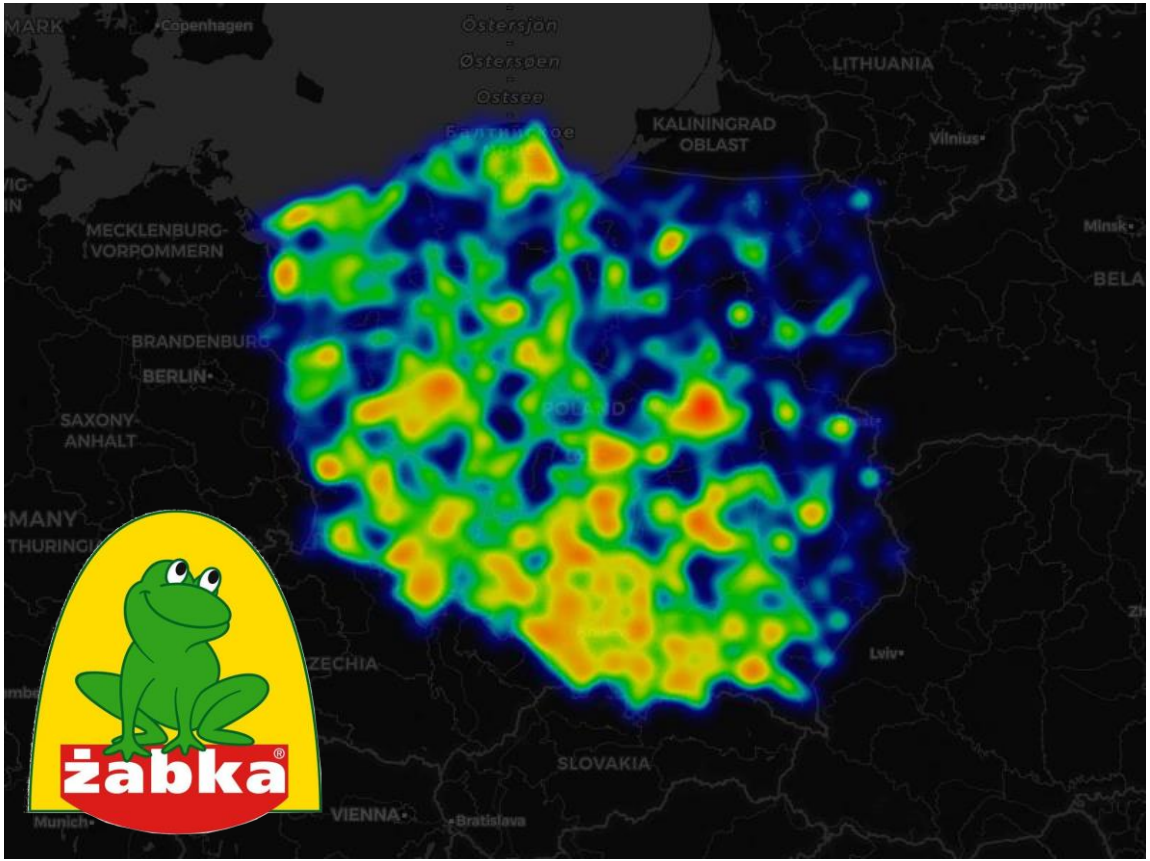
Bubble graph on map



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

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