Problemset 2

1. Instructions

1.1 Data

The file **airquality.csv** contains data on air quality in different locations in Europe. Specifically, the data contains information on the following pollutants:

- `pm10`: particulate matter with a maximum diameter of 10 micrometers (µg/m³)
- `pm2.5`: particulate matter with a maximum diameter of 2.5 micrometers (µg/m³)
- `no2`: nitrogen dioxide (µg/m³)
- `o3`: ozone (µg/m³)
- `so2`: sulfur dioxide (µg/m³)

Data on all pollutants except for ozone represent daily averages. Data on ozone represents the maximum daily 8-hour mean.

1.2 Air Quality Standards

The World Health Organization (WHO) and the European Union (EU) have set air quality standards for the pollutants mentioned above. Interestingly, the WHO standards are stricter than the EU standards. As a consquence of much criticism, the EU has just in October 2024 agreed on stricter standards which are closer to the WHO standards. However, the standards will only be applicable from 2030 onwards. Until then the old standards apply.

WHO Standards

Pollutant	Limits (µg/m³)	Permitted exceedances
pm10	45	3 per year
pm2.5	15	3 per year
no2	25	3 per year
o3	100	3 per year
so2	40	3 per year

EU Standards (until 2029)

Pollutant	Limits (µg/m³)	Permitted exceedances
pm10	50	35 per year
pm2.5	- [a]	- [a]
no2	- [a]	- [a]
o3	120	25 per 3 years
so2	125	3 per year

[a] The EU has not set standards for pm2.5 and no2 at the daily level. However, standards are available at the hourly level and annual level, see the source above.

2. Your task

Tell a short story about air quality in Europe using just 2-3 visualizations. You are the designer of the visualizations and you have to decide what to show and how to show it. Show only what is relevant for YOUR story!

The story must concist of two visualizations:

- The first visualization should provide an overview over all sites, and highlight the sites that you want to focus on in the second visualization. (You do not need to visualize all pollutants. Choose what is relevant for your story.)
- The second (and optionally third) visualization should focus on a small subset of sites or even just one site, and provide a detailed view of airquality at the selected site(s).

Further notes:

- To tell your story, you should consider whether and how you make the WHO and/or EU standards visible in your visualizations.
- Consider the aspects discussed in the lecture on the "Process of Visual Storytelling. In particular: 1. Focus attention, 2. Eliminate Clutter, 3. Add text (to make sure that the viewer takes away your story), 4. Check the CRAP principles, and 5. choose colors wisely.
- Submit a Jupyter Notebook that contains your code and the visualizations. Additional text is not needed in the document. Design the visualizations such that they speak for themselves.