# Geovisualization Lab 3 Visualization for exploration

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Two Datasets will be used in this tutorial and exercise.

**DENL\_selected\_hr.csv:** for time series analysis. It consists of weekday NO2 values, aggregated to each hour of the year, and other information.

**DENL\_selected\_sp.csv:** for spatial data analysis. It consists of weekday NO2 values, aggregated to each hour of the year, and other information.

**Spatiotemporal visualization using Kepler.**

Let us first explore a very powerful tool of Kepler: filter.

1. Go to Kepler.gl
2. Load the data “DENL\_selected\_hr.csv”
3. In “Layers”, the first icon, in Layers, click on “Point”, in Fill color, choose “wkd\_hr\_value”, which means the weekday NO2 values, aggregated to each hour of the year.
4. In left, go to **“Filter”** (the second icon next to the “layers”)
5. Click “+ Add filter”, add “hours”.
6. Move the bar, observe the map.

A map of the world

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# This is very cool and cannot be done easily in other software environment, including R, and other tools that we will introduce later. However, beside this, the data exploration and analysis power of kepler is limited. This time we focus on another easily accessible tool that has greater choices for data exploration and analysis: RawGraphs. <https://www.rawgraphs.io/>

# Time Series Data Visualization

## 1. Load your data

• Choose Upload, and load the dataset “DENL\_selected\_hr.csv”.  
• On the left, find Column Separator and choose “Comma”.  
  
(Scroll down to find “2. Choose a chart”.)

## 2. Choose a chart

• Select “Line Chart”.

## 3. Mapping

• Set the variables as instructed in figure 1 in the Mapping section.

A screenshot of a computer

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Figure 1. setting for the mapping section in A.

## 4. Customize

1. In ARTBOARD, turn on “Show legends”.  
 \*Note: the legend might not appear in the preview window, but it will be visible once you download the image.\*  
  
2. In ARTBOARD, adjust the width to be twice the height.  
  
3. In LABELS, turn off “Show labels”.

The left and right graphs show the air pollution station measurements over time, in Germany (DE) and Netherlands (NL), respectively.

## Exercise 1

1. Describe in a few sentences what you observe from the plot.  
  
2. In Mapping, add “population\_1000” to Color. This will display population density using different colors. Describe what you could observe.   
  
3. In Customize → Colors, try different color schemes.  
  
4. In Step 5: Export, download the image in PNG or JPEG format.

# Spatial Data Exploration

## B1. Plot the weekday daytime NO₂ in geographical space

• Load DENL17\_selected\_sp.csv.  
• Choose “Bubble Chart”.  
• Separate by air pollution types, and use color to indicate population. To do these: you can set the variables as follows:

A screenshot of a computer

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Note: Series: How you want to separate the dataset (e.g., plot NO₂ in urban, suburban areas, etc.).

## Exercise 2

• Describe: What do you observe? Is there a relationship between population and weekday NO₂?  
  
• Change Size to population, and Color to NO₂ value. Which setting do you think is more informative?  
  
• Change Size to NO₂ daytime value, and Color to road\_class\_2\_300 (which represents primary road density). What can you observe? Is there a relationship?  
  
• Form a concrete question and answer it using your visualization.  
 (Don’t forget to download the map.)

## B2. Voronoi Diagram

•This creates the minimum area around each point defined by two variables. When applied to a scatterplot, it’s useful to show the distance between points.  
A blue and orange grid with black dots

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Settings:  
• X-axis: Longitude  
• Y-axis: Latitude  
• Color: Country code  
  
In Customize, turn “Show strokes” on.  
  
Each cell represents the area closest to a particular point.  
It helps visualize how evenly the ground stations are distributed:  
• Irregular or large cells may indicate sparse areas.  
• Small or clustered cells may indicate dense areas.

**Bonus Exercise**

1. Learn more about Voronoi Diagram: https://de.wikipedia.org/wiki/Voronoi-Diagramm.  
 What applications could you think about where the Voronoi diagram is useful?  
  
2. Show the Voronoi diagram you made, and describe what you could observe.

**Submission**

Please complete the exercises, compile your answers in a document, and submit it by **30.06.2025.**