Visualization of the traffic situation in the „Smart City“ Basel (and Switzerland)

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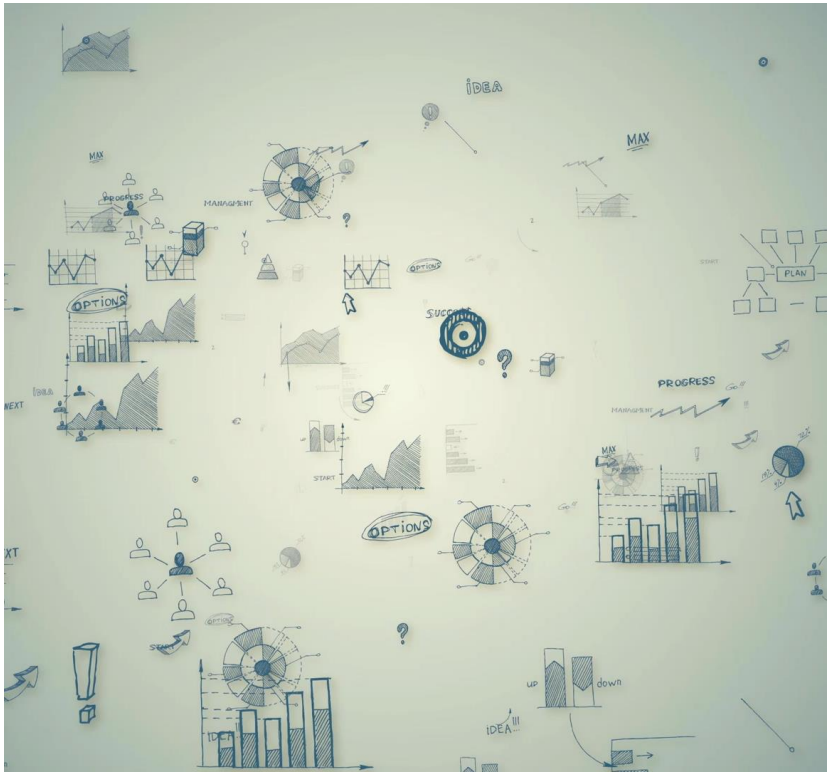
Motivation



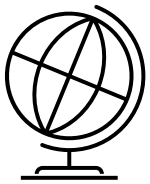
Goal:

Graphically identification of potential pitfalls or bottlenecks in the urban development planning of the „SmartCity“ Basel

Ideas:

- Identifying hotspots for certain kinds of car accidents
- Investigation of the traffic noise development
- (Identification of parking capacity bottlenecks of Basel)

Datasets – An Overview

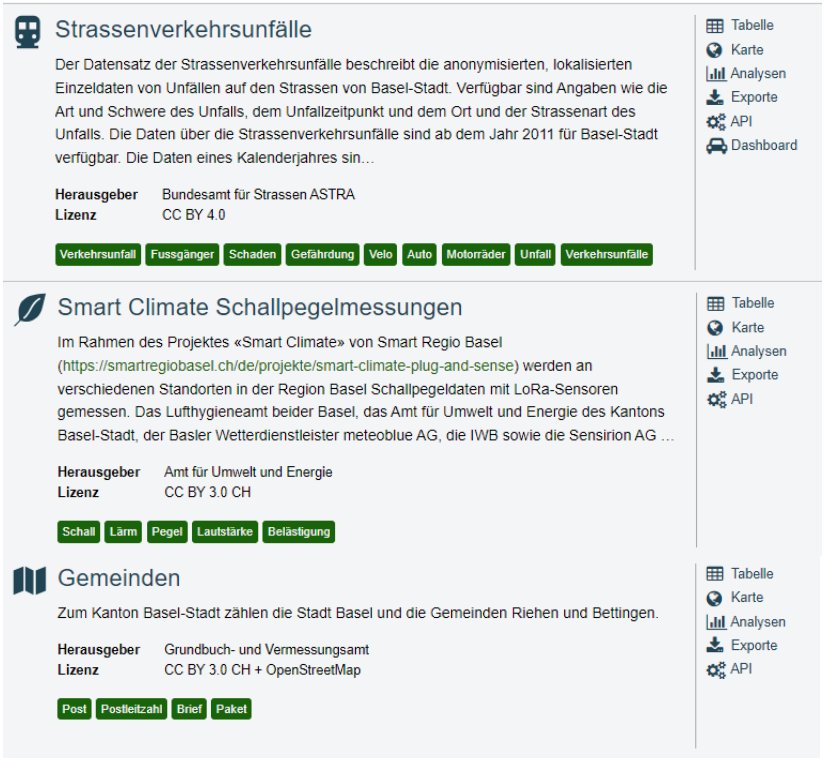


Geographic Data
- Points
- Polygons
- Names

Time Series Data
- Range of up to 11 years
- Very fine grained

Traffic Data
- (Traffic) Noise
- Parking capacity
- Traffic accidents
- …

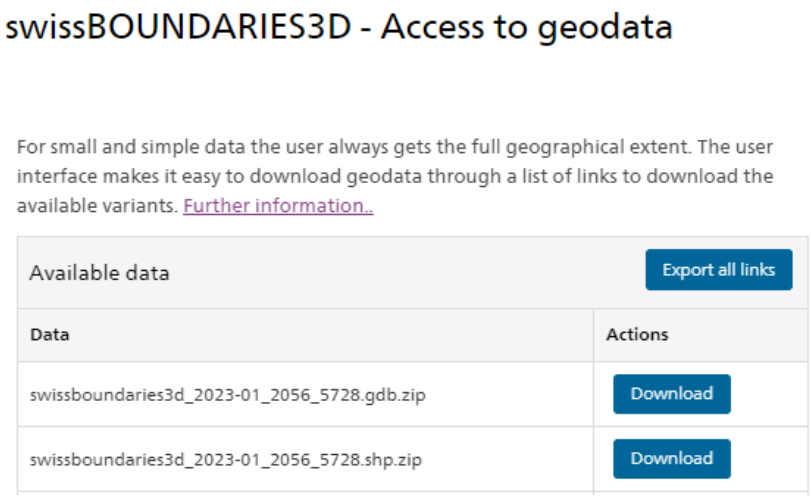
Datasets – An Overview



Datasets provided by Datenportal Basel-Stadt

- Contains 234 datasets about topics like:
  - Geography
  - Mobility and traffic
  - politics
  - …

Datasets – An Overview



Shapefiles provided by Federal Office of Topography swisstopo

- Shapefiles can be worked with in different levels:
  - District territories
  - Jurisdictions
  - Canton areas
  - Country areas

Geo-Coordinates provided in LV95 LN02

Libraries

Used for working with Geodata:

GeoPandas

Shapely

Used for plotting geodata:

Used for creating interactive plots:

bokeh

Used for plotting and styling figures:

seaborn

matplotlib

Datashader

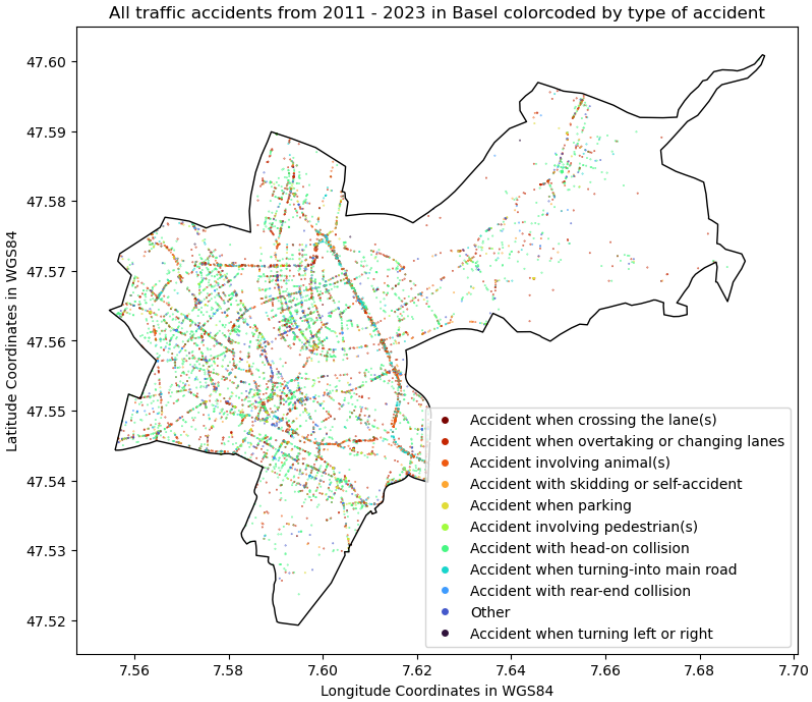
Usecase: Traffic Accidents

Ideas:

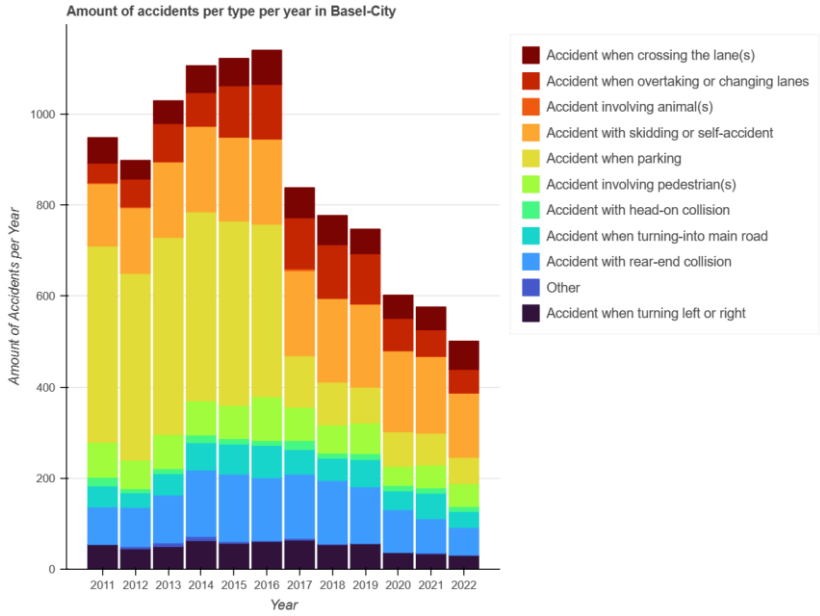
- Identify hotspots for traffic accidents
- Differentiate hotspots regarding the type of accident
- Identify road types with high likelihood for accidents

Overview: Traffic Accidents

Geographical overview of all accidents in Basel (2011 – 2022)



Numerical overview of all accidents in Basel (2011 – 2022)



Overview: Traffic Accidents

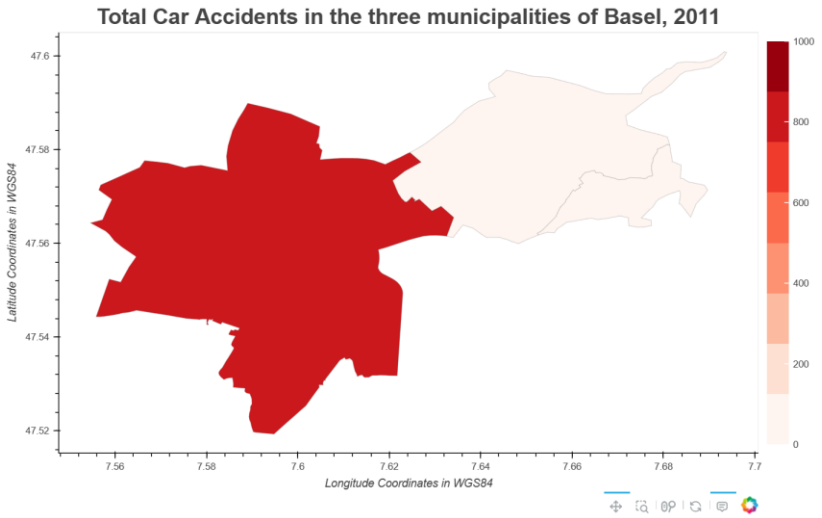
Additional visualization overview: Choropleth Map → Idea:

Idea: → Comparing the municipalities of Basel by e.g. amount of total accidents

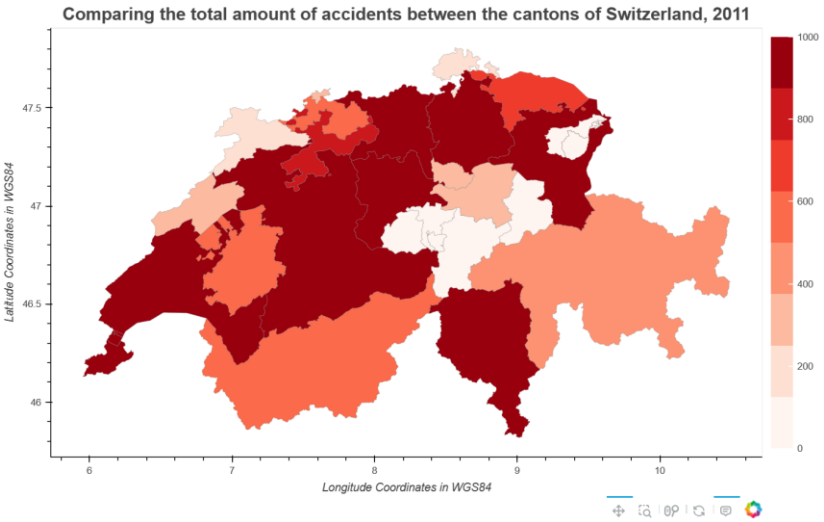
Comparing the municipalities of Basel by e.g. amount of total accidents → Comparison of the danger levels of different road types

Comparison of the danger levels of different road types → Problem:

Problem: → Municiapalities of Basel are not very comparable



Overview: Traffic Accidents



Considerations:

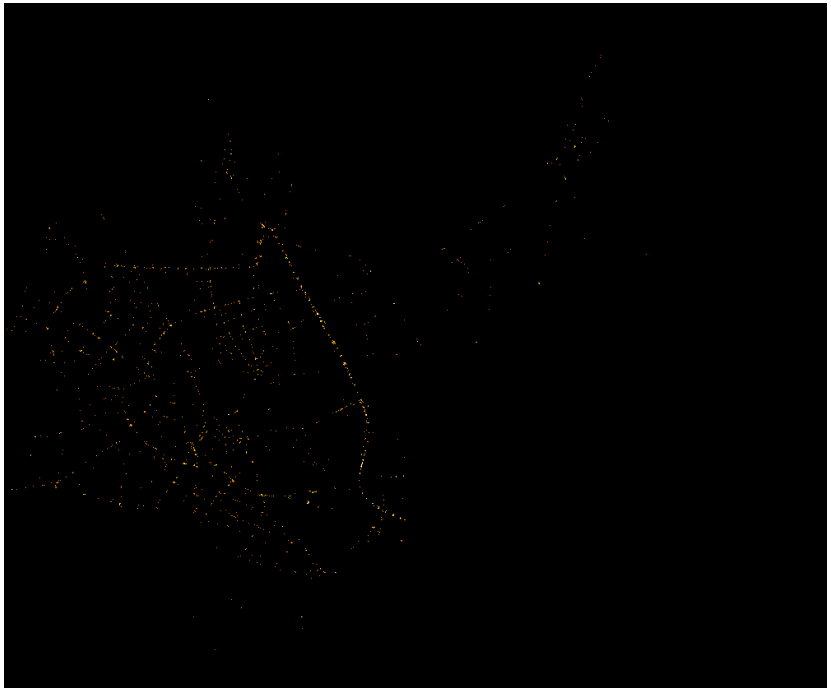
- Sequential Colorcoding enables easy understanding

⇒ White colors are associated with low values

- Colorblind friendly colorcoding

Usecase: Traffic Accidents

Datashader Plot



Idea:

- Aggregate Geopoints to identify hotspots

Problem:

- Dataset is way too small

Usecase: Traffic Accidents

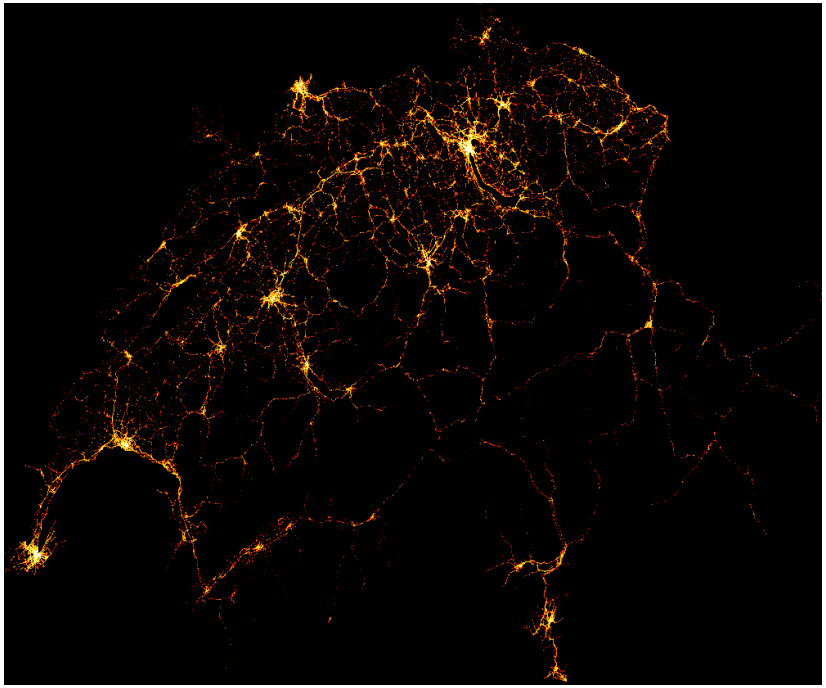
Idea:

- Creating the aggregation plot for the complete switzerland

Outcome:

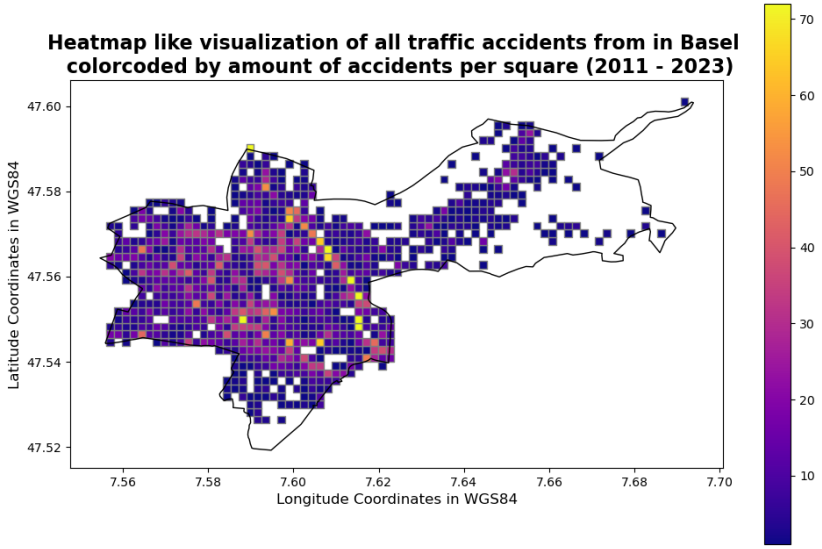
- Hotspots are clearly identifiable
- Still lacking data to differentiate the different kinds of accidents

Aggregation Plot for the complete Switzerland

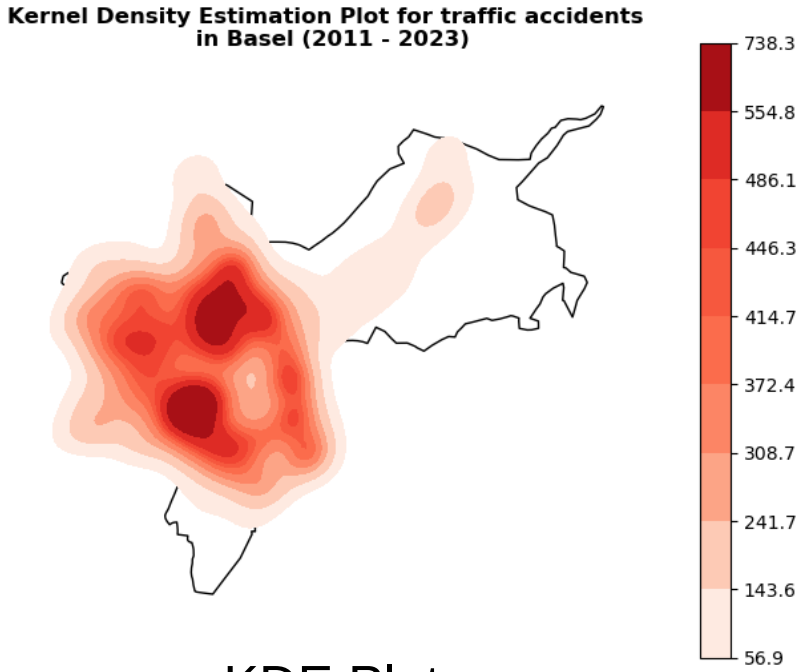


Usecase: Traffic Accidents

Possibilities for identifying accident hotspots:

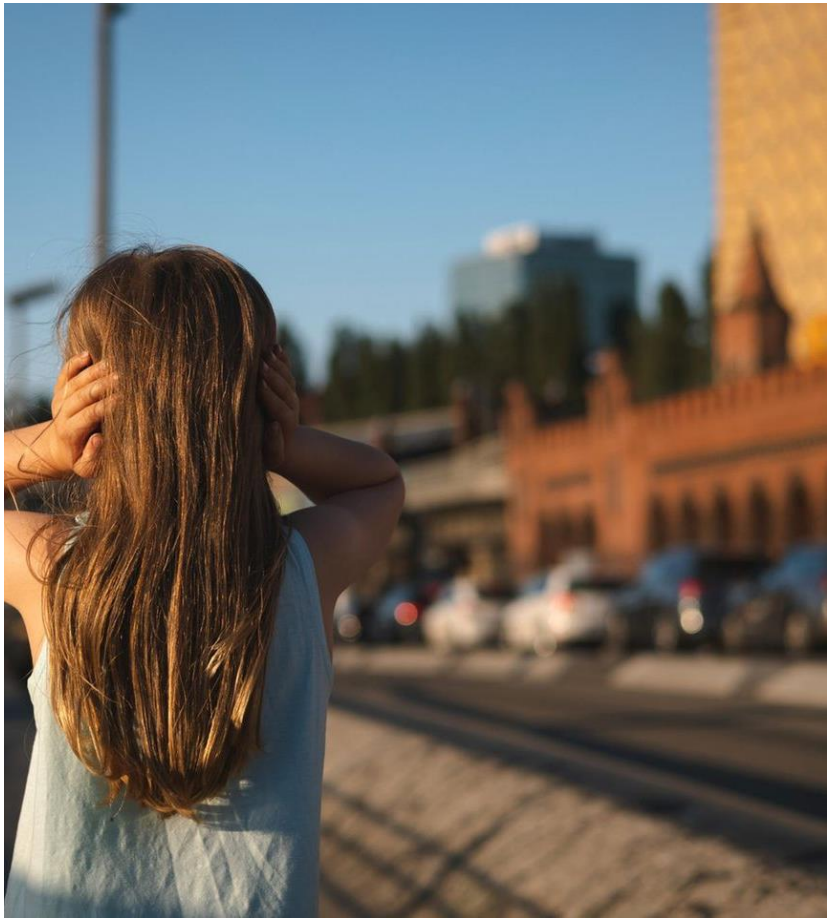


„Gridding“



KDE Plot

Usecases: Traffic Noise



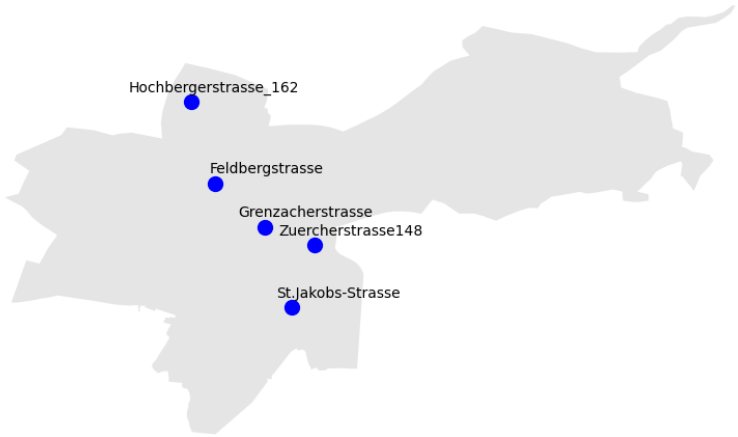
Identifying excessive noise pollution:

Idea:

- Identify hotspots with high noise pollution
- Identify time intervals with high noise pollution

Usecase: Traffic Noise

Location of monitor stations



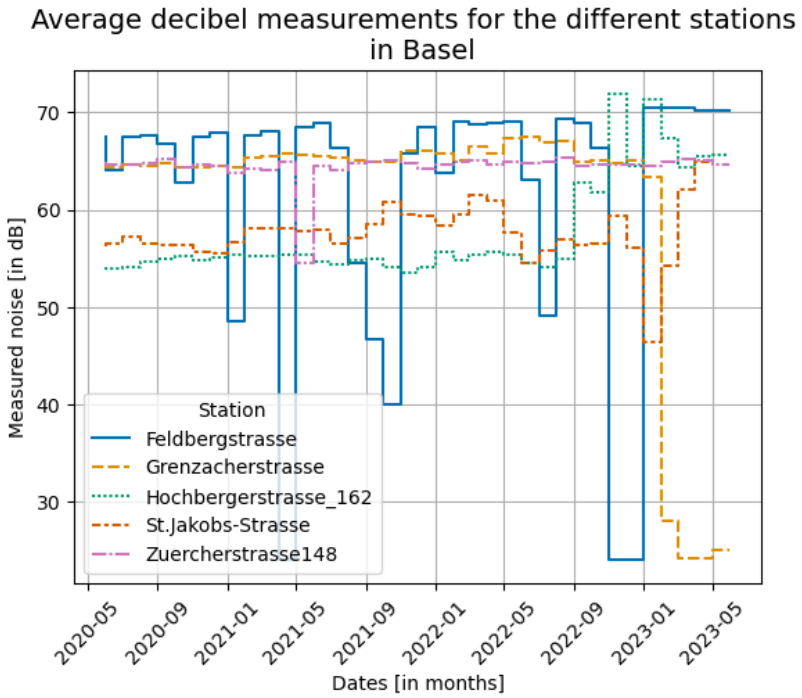
Basel führt Tempo 30 in der Feldbergstraße ein

15. März 2021

Die Geschwindigkeitsreduzierung soll für bessere Luft und weniger Lärm

Visualization – Traffic Noise

First approach:



Considerations and used aesthetics

Considerations:

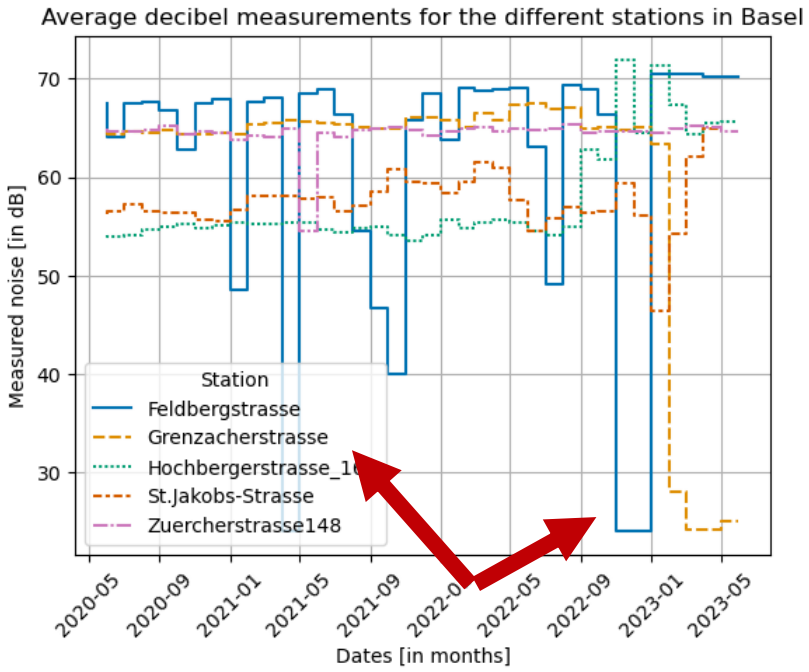
- The visualization displays the monthly averages per station
- Using grids and drawstyle “steps-pre” for better readability

Aesthetics used:

- Colorblind friendly colors
- Different linestyles

Visualization – Traffic Noise

First approach:



Problems: Huge outliers

Possible Reasons:

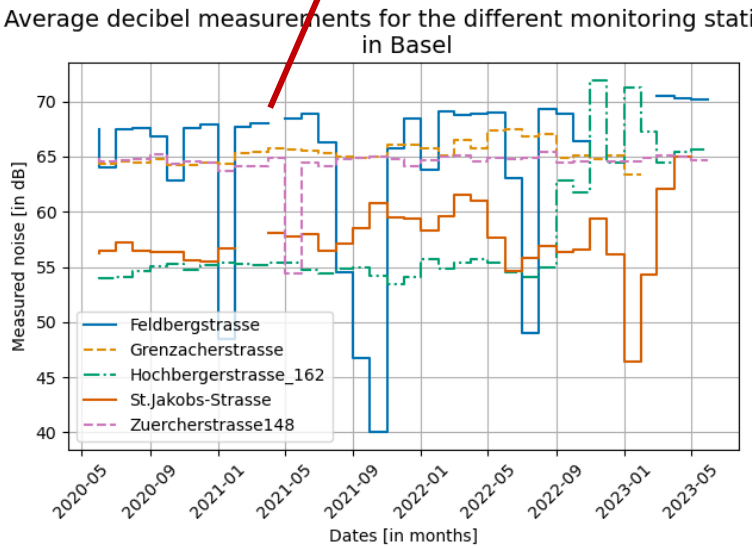
- Probably Corona Lockdown
- Road Closure
- Inconsistent measurements of the sensor

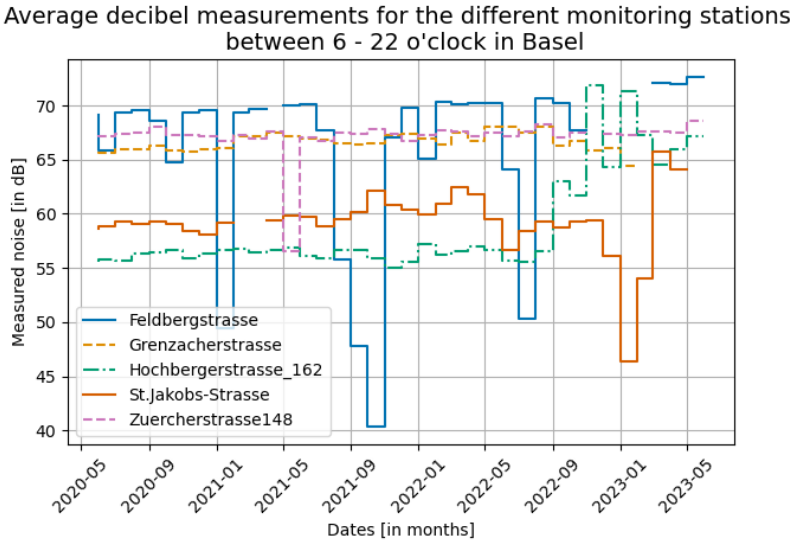
Solution: All values for this time intervall were exactly 24.1

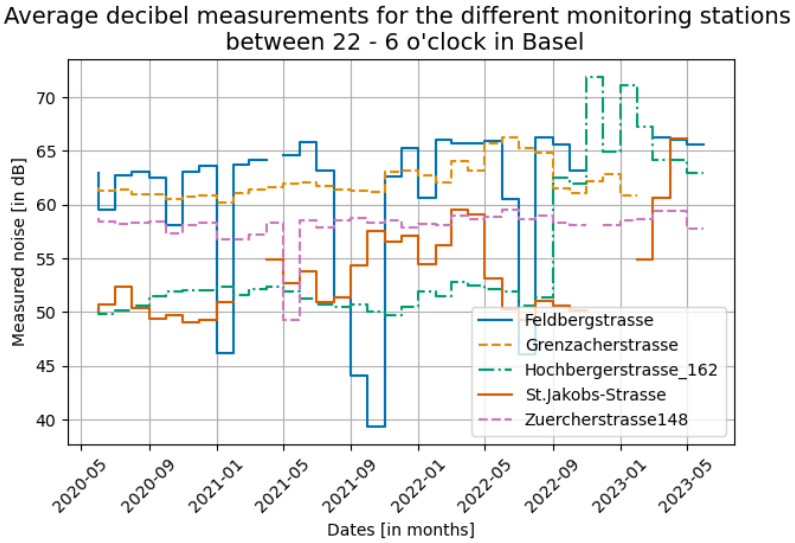
	Station	date	Wert
11	Feldbergstrasse	2021-05	24.1
30	Feldbergstrasse	2022-12	24.1
31	Feldbergstrasse	2023-01	24.1

Visualization – Traffic Noise

Seaborn







Conclusion

Usage of the right tools / libraries is key

Aggregating different data sources can be quite challenging

Watch out for inconsistencies in the data and how you handle them

Future Work

- Adding more interactive slider functions to make use of time series data
- Usage off additional traffic data
- Combining different data to detect causalities or corelations
- Combining visualizations in a dashboard

Thanks for listening!

Any questions?

Links

Datasets:

- https://data.bs.ch/explore/?sort=modified
- https://data.geo.admin.ch/
- https://www.swisstopo.admin.ch/en/geodata/landscape/boundaries3d.html

Tutorials:

- https://james-brennan.github.io/posts/fast_gridding_geopandas/
- https://towardsdatascience.com/walkthrough-mapping-basics-with-bokeh-and-geopandas-in-python-43f40aa5b7e9
- https://towardsdatascience.com/visualizing-geospatial-data-in-python-e070374fe621

Other:

- https://www.baden.fm/nachrichten/basel-fuehrt-tempo-30-in-der-feldbergstrasse-ein-727683/
- https://www.schweizerbauer.ch/regionen/nordwestschweiz/basel-stadt-kann-sich-nicht-mehr-als-europas-umweltstadt-bewerben/
- https://stock.adobe.com/at/search?k=%22noise%20pollution%22