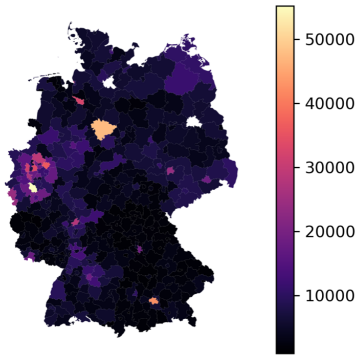
Data Science II - Data Visualization

Lab 5 - Summer Semester 2024
https://moodle.haw-landshut.de/course/view.php?id=10969

1. Choropleth Maps

Use `geopandas` to read in the shape file `vg2500_krs.shp` and `pandas` to read in the csv-file `arbeitslos2020.csv`. From both datasets create the corresponding choropleth map showing the 2020 unemployment numbers on a map of Germany. Your visualization should be similar to



2. Interactive Widgets

Generate an interactive plot for the following functions (one plot for both functions) $f(x) = \sin(kx)$ and $g(x) = \cos(mx)$ with sliders for the parameters $k \in [1, 3]$ and $m \in [2, 4]$.

3. Interactive Visualizations with Voila

Read the `Voila` documentation at `https://voila.readthedocs.io/en/stable/index.html` and run a few of the example notebooks from the repository. Use `pandas.read_csv(...)` to read in `titanic.csv`. Use column "Survived" as filter column for a dropdown widget. If the user chooses 0 in your dropdown, show only rows with value 0 in column "Survived". If the user chooses 1 in your dropdown, show only rows with value 1 in column Survived. Hints:

- Use the display function to display the dataframe and the dropdown widget.
- Implement a corresponding handler function for the filtering logic (filter rows in dataframe according to the value of the "Survived" column.
- Use widgets.Dropdown.observe(handler, names="value") to link the dropdown to the event handler.

Generate a `Voila` app form your Jupyter notebook. The result should look similar to

0

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S
5	6	0	3	Moran, Mr. James	male	NaN	0	0	330877	8.4583	NaN	Q
6	7	0	1	McCarthy, Mr. Timothy J	male	54.0	0	0	17463	51.8625	E46	S
7	8	0	3	Palsson, Master. Gosta Leonard	male	2.0	3	1	349909	21.0750	NaN	S
...	...	...	...	...	...	...	...	...	...	...	...	...
884	885	0	3	Sutehall, Mr. Henry Jr	male	25.0	0	0	SOTON/OQ 392076	7.0500	NaN	S
885	886	0	3	Rice, Mrs. William (Margaret Norton)	female	39.0	0	5	382652	29.1250	NaN	Q
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN	S
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN	Q

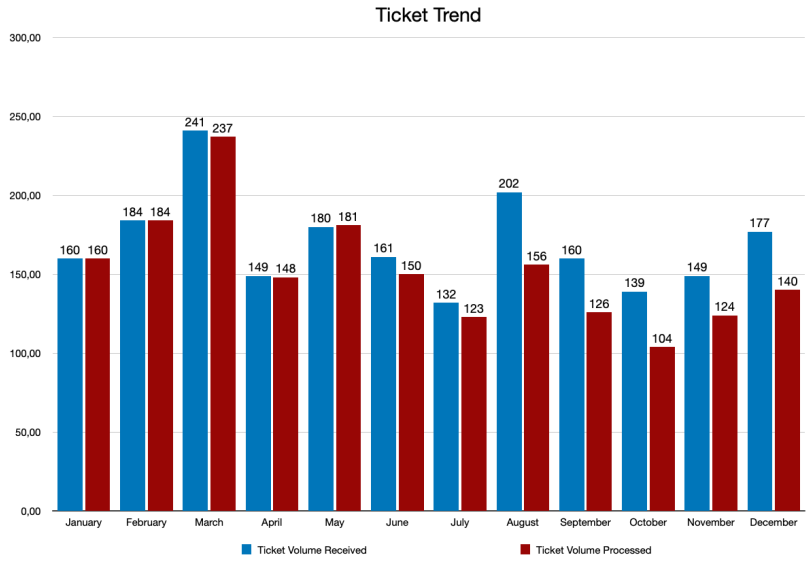
549 rows × 12 columns

4. Interactive Visualizations with Altair

Read the documentation on interactive visualizations with `Altair` and Vega at https://altair-viz.github.io/user_guide/interactions.html, reproduce existing plots you've created with `matplotlib` wit `Altair` and modify those to be *interactive*.

5. Storytelling with data

What would you improve about the following visualization?



Source: C. Nussbaumer Knaflic - Storytelling with Data, Wiley, 2015

Story: You manage an IT-team. Your team receives tickets or technical issues. In the past year, a few of the team members left and you decided at that time not to replace them. You've been asked about your hiring needs for the coming year. You see that there is some evidence your team's productivity is suffering and now want to create a visualization as a basis for your hiring request.

What improvements could help tell a better story with the data? Draw a better visualization with pen and paper (or a visualization tool of your choice). The data is available at ./data/tickets.csv.