
Course: Data Engineering (SAKI)
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Introduction



The correlation between traffic fine frequencies and weather data (temperature, precipitation, and wind speed) in Bonn, Germany in the year 2020.

This project analyzes how weather condition relates to the speed limit on roads in the Bonn city area. Moreover, it analyzes the traffic fine occurrences due to exceeding the speed limit and its relation to temperature, wind, and precipitation in particular dates in 2020 from January to December.

The analysis helps to identify patterns in driving behavior related to weather conditions by combining the speeding fine dataset with weather data. Authorities can allocate resources such as police patrols or traffic cameras to areas that are more prone to accidents during certain weather conditions. This information can be used to improve road safety by allocating resources more effectively, improving driver education through campaigns, and reducing the incidence of speeding during certain weather conditions.

Traffic fines in 2020

This dataset contains information on fines for speeding in the Bonn City area in 2020. It includes the date, time, place, fines, and offense number.

- Metadata URL: <https://mobilithek.info/offers/-4621475474583083551>
- Data URL: <https://opendata.bonn.de/sites/default/files/GeschwindigkeitsverstoesseBonn2020.csv>
- Data Type: CSV

Weather Data

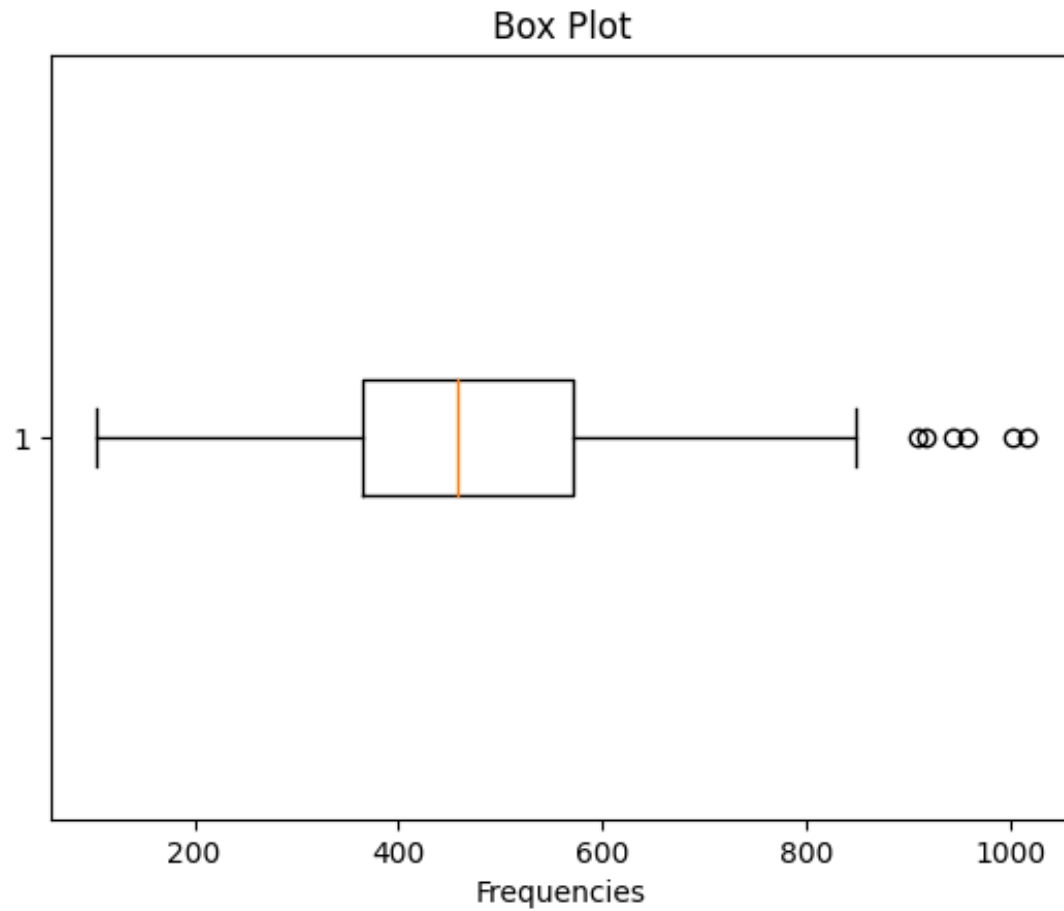
This dataset is generated from the POWER project of NASA (Nasa power api).

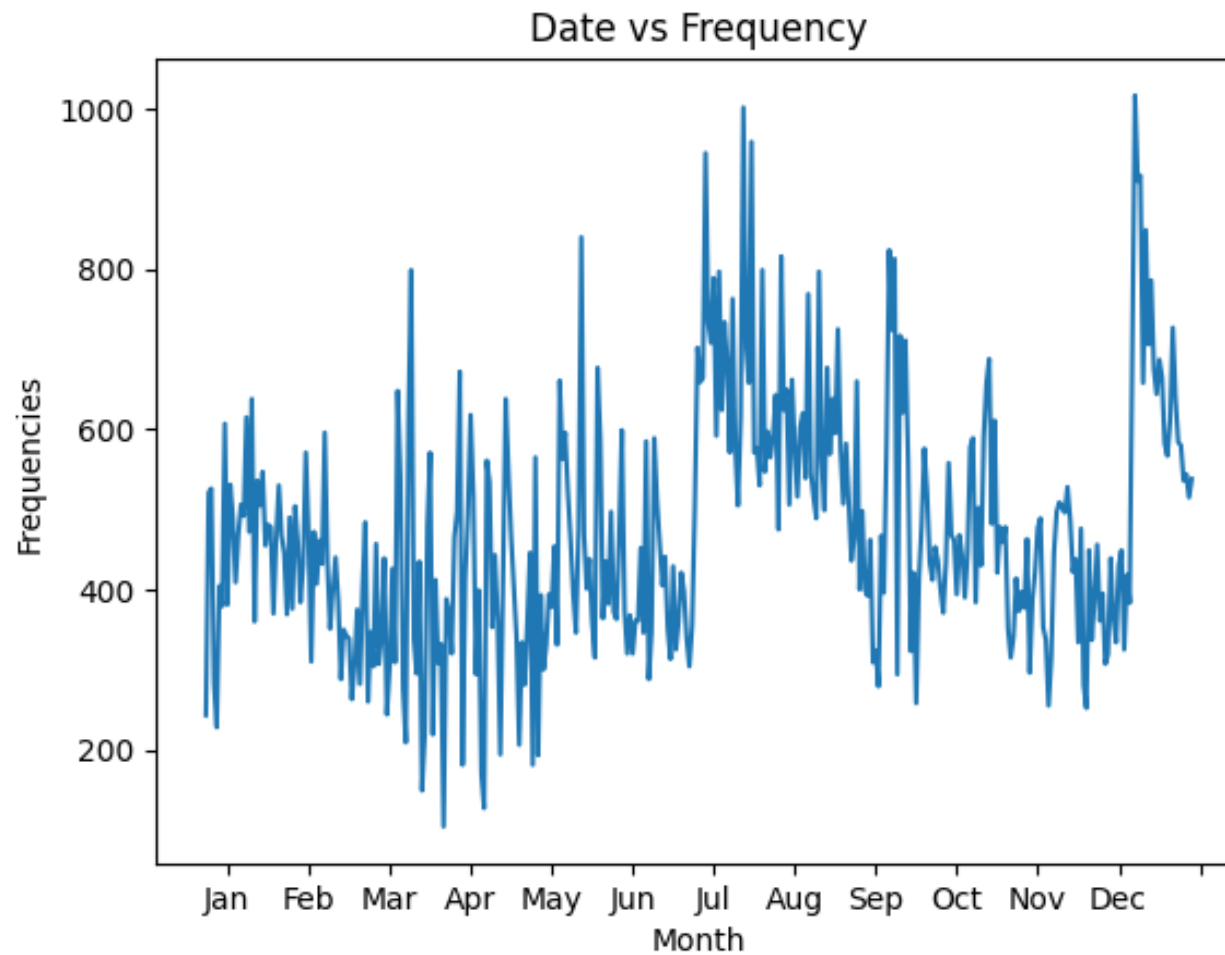
- Following parameters are used to get the data:
 - Date: Jan 01, 2020 to Dec 31, 2020
 - Temporal: Daily
 - Location: Bonn (latitude: 50.7324, longitude: 7.1019)
- Following parameters are obtained from the API:
 - T2M: Temperature at 2 Meters:
The average air (dry bulb) temperature at 2 meters above the surface of the earth.
 - PRECTOTCORR: Precipitation Corrected:
The bias corrected average of total precipitation at the surface of the earth in water mass (includes water content in snow).
 - WS10M: Wind Speed at 10 Meters:
The average of wind speed at 10 meters above the surface of the earth.
- Metadata URL: <https://power.larc.nasa.gov/data-access-viewer>
- Data Type: CSV

	Unnamed: 0	T2M	PRECTOTCORR	WS10M
0	20200101	-0.95	0.06	4.36
1	20200102	-0.57	0.11	5.56
2	20200103	3.53	2.00	7.14
3	20200104	2.48	0.88	6.63
4	20200105	2.86	0.14	3.32
5	20200106	-0.56	0.23	5.00
6	20200107	2.76	0.62	5.76
7	20200108	5.46	6.83	6.02
8	20200109	7.72	8.78	7.26
9	20200110	5.29	3.22	5.97

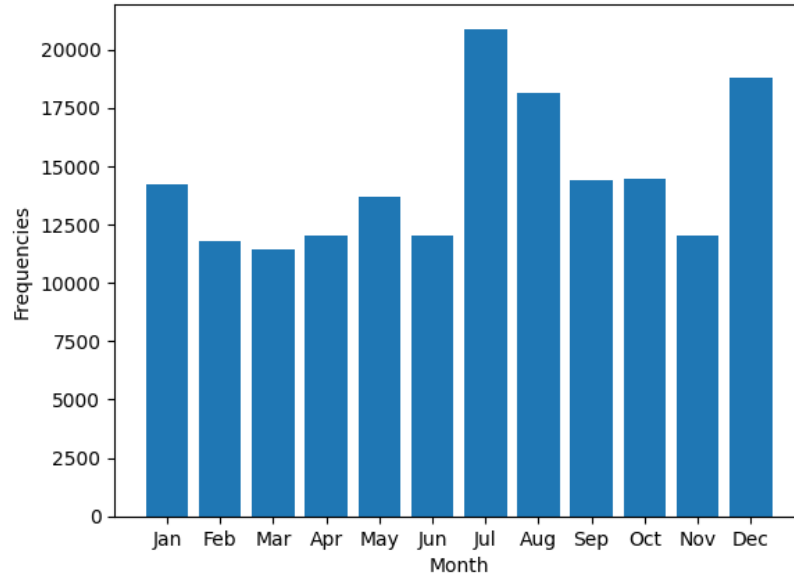
Unnamed: 0	TATTAG	TATZEIT	TATORT	TATBESTANDBE_TBNR	GELDBUSSE
0	0	01.01.2020	613 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103203	25
1	1	01.01.2020	1215 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103203	25
2	2	01.01.2020	1739 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103202	15
3	3	01.01.2020	118 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103202	15
4	4	01.01.2020	333 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103202	15
5	5	01.01.2020	354 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103204	35
6	6	01.01.2020	422 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103202	15
7	7	01.01.2020	550 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103762	160
8	8	01.01.2020	1041 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103203	25
9	9	01.01.2020	1216 Bonn, B9 Mainzer Straße Bahnüberführung FR Mehlem	103202	15

	DATE	T2M	PRECTOTCORR	WS10M	FREQUENCIES
0	2020-01-01	-0.95	0.06	4.36	243
1	2020-01-02	-0.57	0.11	5.56	521
2	2020-01-03	3.53	2.00	7.14	526
3	2020-01-04	2.48	0.88	6.63	283
4	2020-01-05	2.86	0.14	3.32	228
5	2020-01-06	-0.56	0.23	5.00	404
6	2020-01-07	2.76	0.62	5.76	379
7	2020-01-08	5.46	6.83	6.02	607
8	2020-01-09	7.72	8.78	7.26	381
9	2020-01-10	5.29	3.22	5.97	531

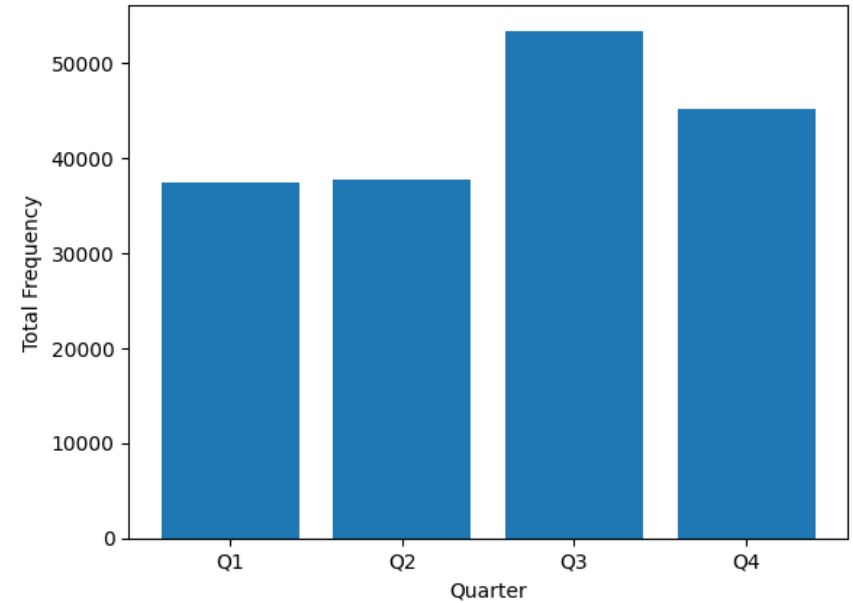


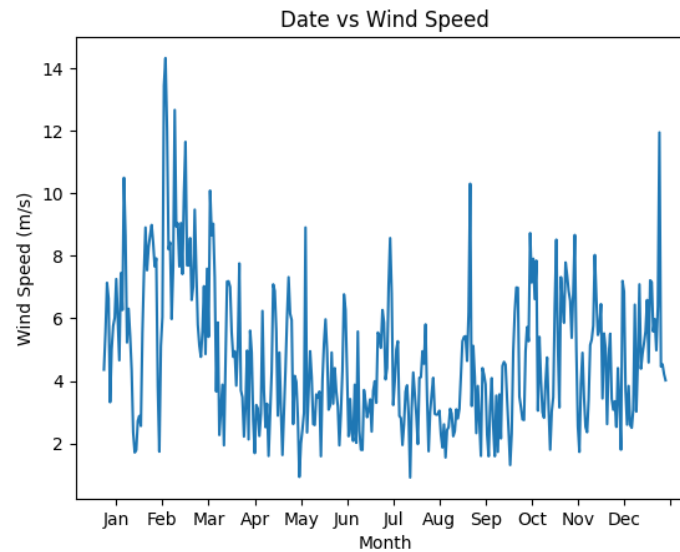
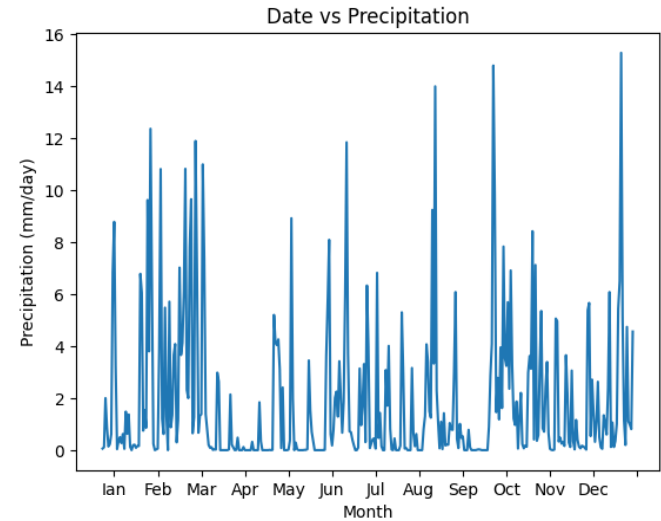
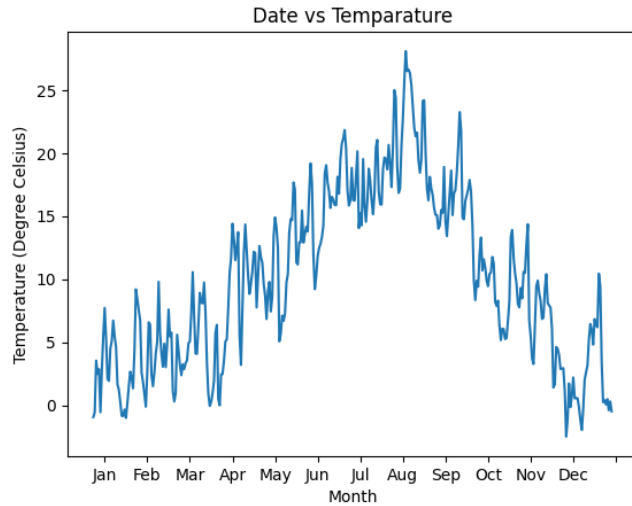


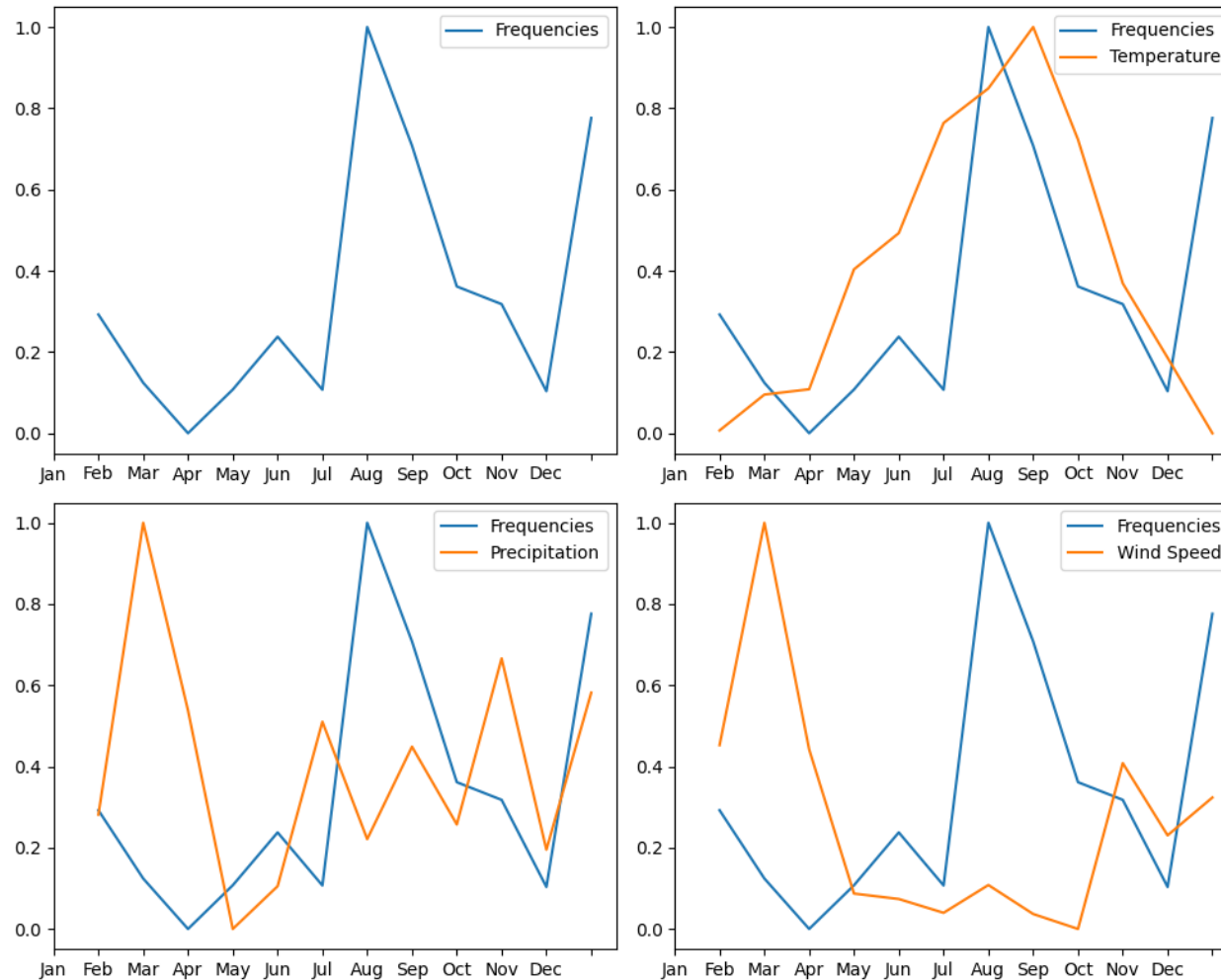
Date vs Frequency



Quarterly Frequency Sum







Correlations between traffic fine occurrences and weather data are found by exploring the datasets. The main takeaways are:

1. Occurances of speed limit exceeding by driving are higher in quantity in the latter half period of the year.
2. These occurrences are reported highest in the 3rd quarter of the year.
3. Overall, the frequency of traffic fines correlates with the temperature, it increases as the temperature rise.
4. In terms of precipitation, less number of fines were incurred in the first quarter during high precipitation. Nevertheless, this trend fluctuates through the rest of the year. Therefore, It can be concluded that precipitation does not have much correlation with traffic fines.
5. Fines are incurred higher in number when the wind speed is lower and vice versa. In other words, there is a strong relation between the speed limit exceeding behavior with the wind speed.

In conclusion, the behavior of exceeding the speed limit has shown some correlation with the temperature and wind speed. However, precipitation does not have a valuable connection with traffic fines.

In terms of future work, there are several potential avenues to explore based on the current progress and findings:

1. Datasets from other years such as 2017, 2018, 2019, etc can be used to gain more confidence in the summary.
2. Dive deeper into the existing data by applying advanced analytical techniques and exploring additional variables. This can help uncover hidden patterns, relationships, or anomalies that were not initially considered.
3. Other parameters from weather data can be considered for more rigorous investigation.
4. Correlation analysis could be improved with more statistical analysis such as correlation coefficients.
5. Consider incorporating external data sources or gathering additional data to enhance the existing dataset. This can provide a broader perspective and more comprehensive insights into the problem at hand. For instance, datasets related to the number of traffics on the road during a particular period can be used.

Thank you!