Project #1

Exploring Weather Trends

Analyzing local and global temperature data and comparation the temperature trends in the city of Munich to overall global temperature trends.

1. Extracting the data from the data base using SQL

1.1 Extracting the city data

> **SELECT * FROM city_data**

1.2 Extracting the city list

> **SELECT * FROM city_list**

1.3 Extracting the city data

> **SELECT * FROM global_data**

As result of 1.1, 1.2 and 1.3 three CVS were obtained: city_data.csv, city_list.csv, global_data.csv

2. Exploring the data

2.1 First look at data

```
In [23]:   #import the libraries
           import pandas as pd
           import numpy as np
           import matplotlib.pyplot as plt
```

```
In [2]: #reading the csv data
        city_data = pd.read_csv('city_data.csv', index_col = 'year')
        city_list = pd.read_csv('city_list.csv')
        global_data = pd.read_csv('global_data.csv', index_col = 'year')
```

```
In [3]: city_data.head()
```

Out[3]:

year	city	country	avg_temp
1849	Abidjan	Côte D'Ivoire	25.58
1850	Abidjan	Côte D'Ivoire	25.52
1851	Abidjan	Côte D'Ivoire	25.67
1852	Abidjan	Côte D'Ivoire	NaN
1853	Abidjan	Côte D'Ivoire	NaN

```
In [4]: city_list.head()
```

Out[4]:

	city	country
0	Abidjan	Côte D'Ivoire
1	Abu Dhabi	United Arab Emirates
2	Abuja	Nigeria
3	Accra	Ghana
4	Adana	Turkey

```
In [5]: global_data.head()
```

Out[5]:

year	avg_temp
1750	8.72
1751	7.98
1752	5.78
1753	8.39
1754	8.47

2.2 Searching for the closest city

Let's take a look to the cities in Germany and choose the closest city to Ingolstadt

```
In [6]: city_data['city'][city_data['country']=='Germany'].unique()
```

Out[6]: array(['Berlin', 'Hamburg', 'Munich'], dtype=object)

The city of **Munich** is chosen as the reference

2.3 Exploring the data of Munich

```
In [7]: munich_data = city_data[city_data['city']=='Munich']
        munich_data.head()
```

Out[7]:

year	city	country	avg_temp
1743	Munich	Germany	1.32
1744	Munich	Germany	6.09
1745	Munich	Germany	-2.15
1746	Munich	Germany	NaN
1747	Munich	Germany	NaN

Let's explore and deal with missing values

```
In [8]: munich_data.fillna(method='ffill')
```

Out[8]:

year	city	country	avg_temp
1743	Munich	Germany	1.32
1744	Munich	Germany	6.09
1745	Munich	Germany	-2.15
1746	Munich	Germany	-2.15
1747	Munich	Germany	-2.15
...	...	...	...
2009	Munich	Germany	5.89
2010	Munich	Germany	4.85
2011	Munich	Germany	6.56
2012	Munich	Germany	5.88
2013	Munich	Germany	6.00

271 rows × 3 columns

2.4 Buildig the moving average

```
In [16]: munich_data['avg_temp_mv'] = munich_data['avg_temp'].rolling(7).mean()
         global_data['avg_temp_mv'] = global_data['avg_temp'].rolling(7).mean()
         temp_dif = global_data['avg_temp_mv'] - munich_data['avg_temp_mv']
```

```
C:\Users\F4HOBUP\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: Se
```

2.5 Plotting the data

```
In [22]: plt.figure(figsize=(15,10))
         munich_data['avg_temp_mv'].plot(lw=4, label = 'Munich temperature')
         global_data['avg_temp_mv'].plot(lw=4, label = 'Global temperature')
         temp_dif.plot(lw=4, ls='--', label ='Temperature difference')
         plt.title('Comparison of global temperature and temperature in Munich',
         fontsize = 20)
         plt.xlabel('Year', fontsize = 20)
         plt.ylabel('Temperature, °C', fontsize = 20)
         plt.legend(loc='best')
         plt.grid()
         plt.show()
```
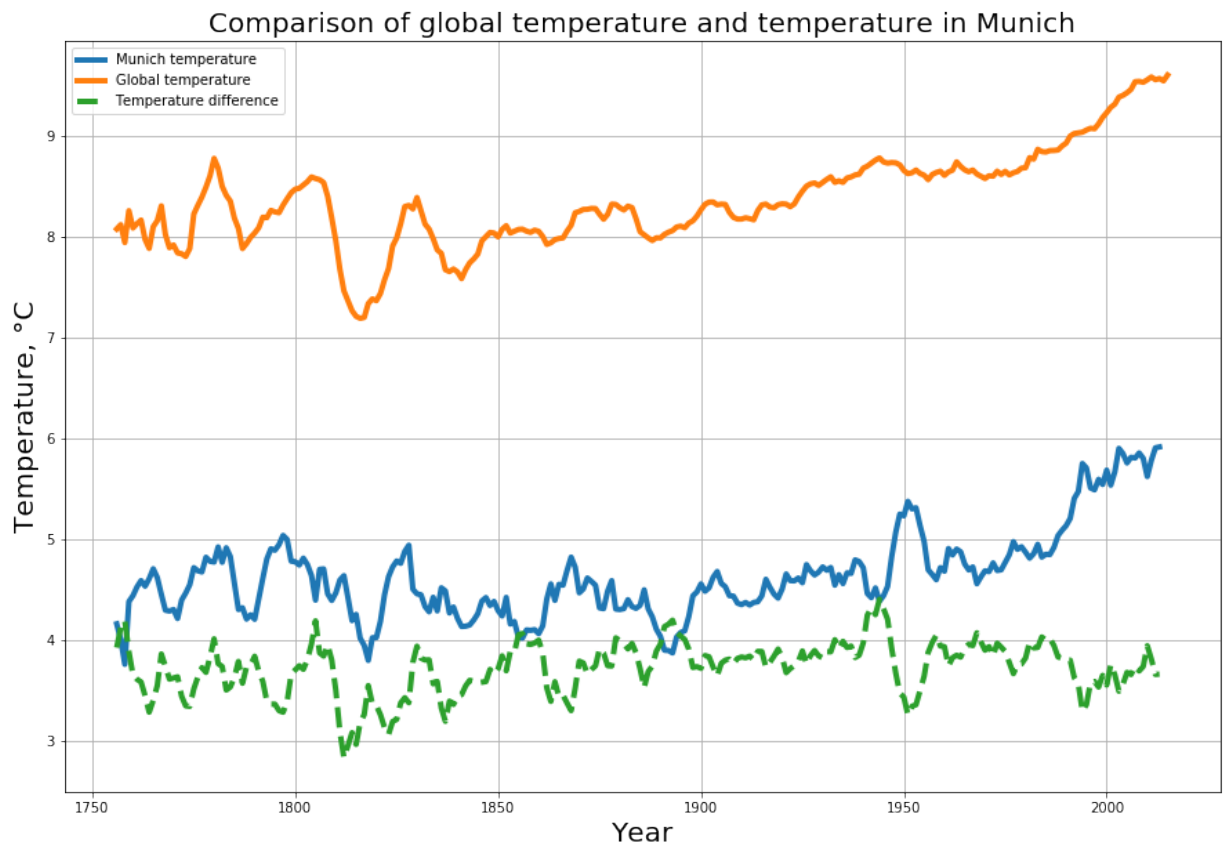

2.6 Conclusions

1. Is your city hotter or cooler on average compared to the global average? --> The temperature in the city of Munich was over the years cooler as the average global temperature
2. Has the difference been consistent over time? --> the difference of the temperatures was pretty consistent over time and was between 3 and 4 degrees
3. How do the changes in your city's temperatures over time compare to the changes in the global average? --> on the picture you can see that the temperatures correlate very well with

each other. Increases and decreases in global temperature can also be felt in Munich

4. What does the overall trend look like? --> until 1900 in the period before industrialization, the average temperature was around 8 degrees. After industrialization, the temperature rose all over the world and in Munich as well
5. Is the world getting hotter or cooler? --> after 1900 ist getting definitely hotter
6. Has the trend been consistent over the last few hundred years? --> the trend is consisten raising over the past few hundred years