1. What tools did you use for each step? (Python, SQL, Excel, etc)

a) Firstly, I extracted the data for Munich which is the nearest big city to me using the SQL query:

SELECT * FROM CITY_DATA WHERE CITY = ‘Munich’;

Then is selected the whole table for the weather trends from all the globe using the following query:

SELECT * FROM global_data

b) Data was downloaded as a CSV file by which I will use python to do some calculations on them.

c) I used python to preprocess the data and clean them and impute the missing values.

2. How did you calculate the moving average?

Moving average is calculated using the average of data over a specific period of time, it works by taking the mean value for a constant small period over the whole period, this process is similar to the discretization process.

As we increase the period to discretize the data we have, the curve becomes smoother but it losses a lot of information that may mislead us while getting the insights from the data.

In my case, I used the sliding window to include 10 years which is a good choice in my use case.

$$SMA_k = \frac{p_{n-k+1} + p_{n-k+2} \cdots + p_n}{k}$$

$$= \frac{1}{k} \sum_{i=n-k+1}^{n} p_i$$

Python package pandas have a built-in function called rolling () to provide a rolling window over the data, and another function is applied across the windows weather mean, sum. etc.

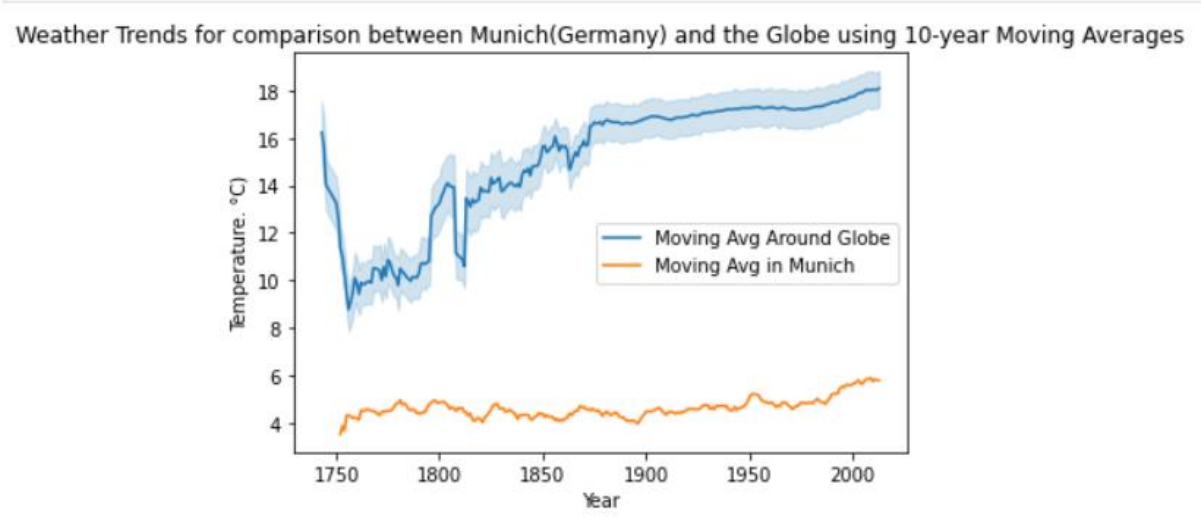
The first step was to import the related libraries and read the CSV file then apply the rolling function on the selected column specifying the sliding window and the function to be applied on the window itself.

3. What were your key considerations when deciding how to visualize the trends?

The important thing is the period for each line chart, to truly make a good comparison for the two lines, the time period should be identical.

The time period for Munich is coincidently similar.

Here is the plot



The first insight from the global change in temperature is that the earth's temperature starts to increase from the end of the 19s due to the industrial revolution.

The increase in the temperature of Munich is not the increase in the global temperature.

But from both trends, it's obvious that the world temperature is going to increase.

In the middle of the 18s century, there is a great change in the temperature of the earth but this may be a human error as the measuring techniques at that time were not so precise.

Something happens in the world in 1820 but Munich was not affected by it as the global temperature collapses for around 30 years.