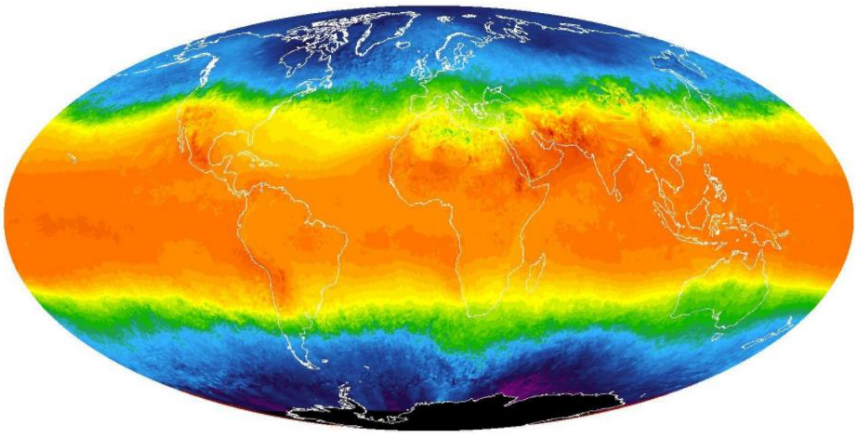
Project # 1:



Explore Weather Trends

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1. Summary

The goal of the project ***"Explore weather trends"*** is to analyze local and global temperature, to create a visualization and to make observations about the similarities and difference between the world average and the city where I live.

2. Tools

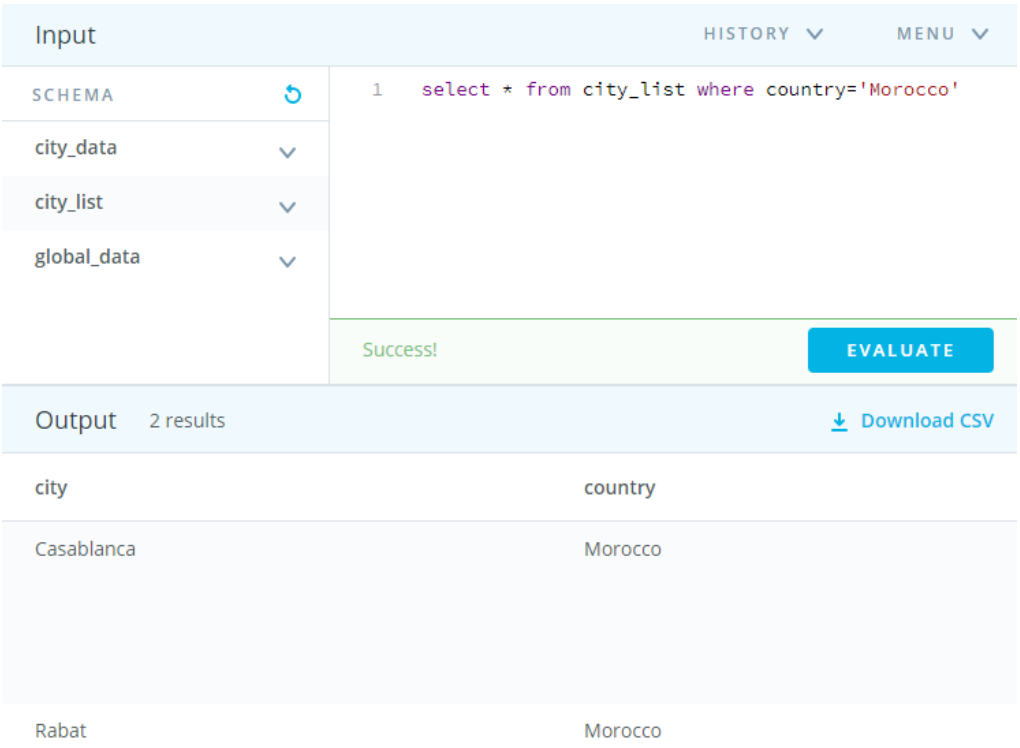
To complete this project, I'll use the following tools:

- ***SQL*** for data extraction.
- ***Excel*** for analyzation, manipulation and visualization of data.

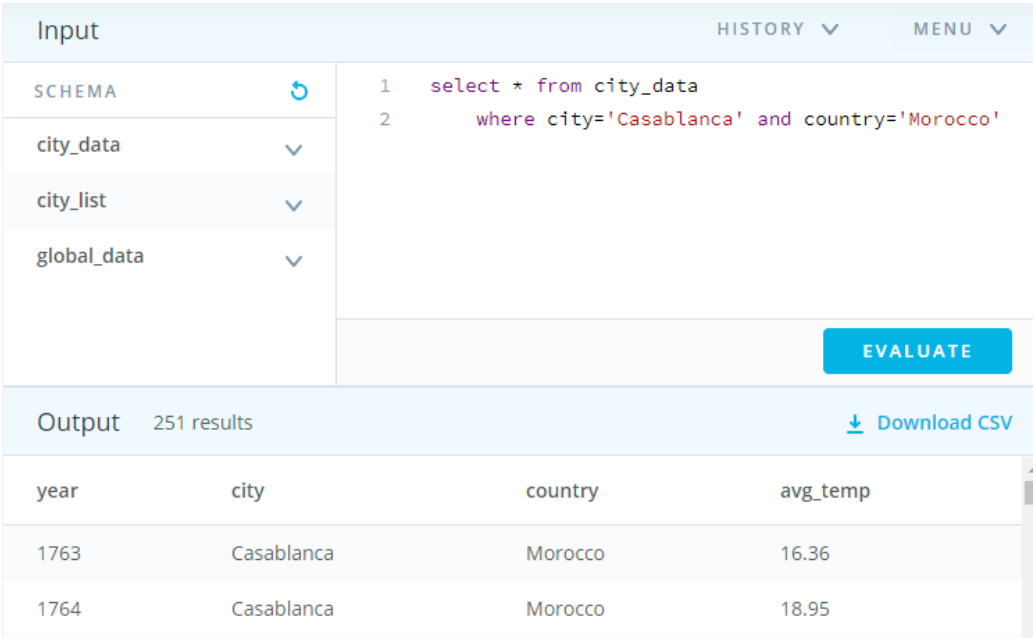
3. Data extraction

To extract data from the temperatures database, I wrote the SQL query and I followed the steps below:

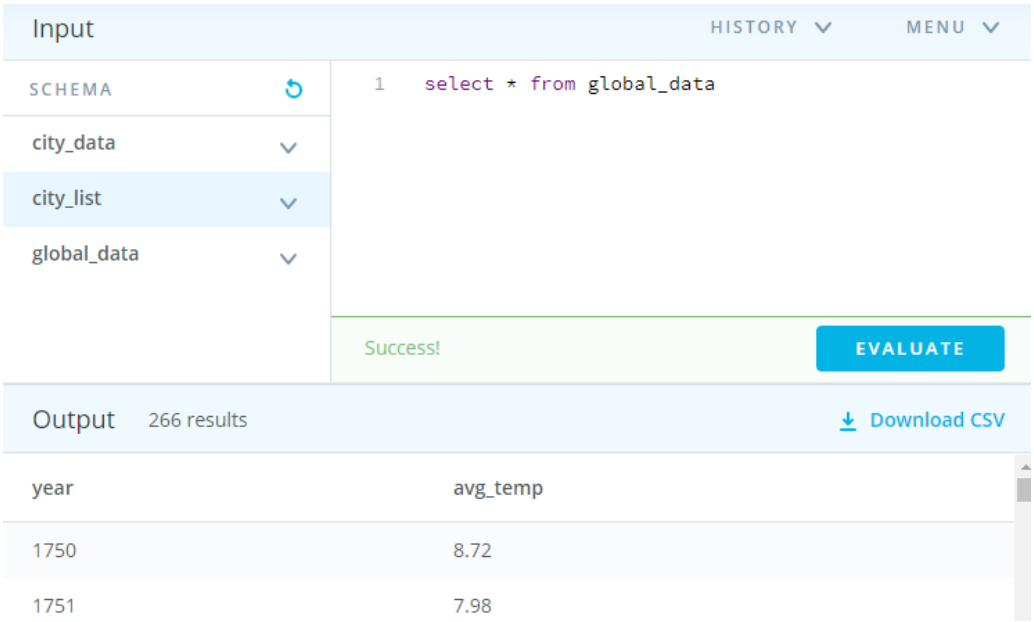
✓ Find the city where I currently live in:



✓ Extract the temperatures data of **Casablanca** city:



✓ Extract the Global data:



All data has been extracted as CSV files and imported to Excel for manipulation and visualization.

4. Data Manipulation and visualization:

After analyzing data, I noticed that the global temperature is available for range of years ***1750-2015*** while the Casablanca temperature is available for range of years ***1763-2013***, In same time, there was some missing data in the Casablanca temperature for range of years ***1763-1782***. Therefore, the comparison will be made for the range of years ***1783-2013***.

Using the moving average (MA) is best way to decrease the yearly fluctuation and to get a smooth graph in order to observe the long-term weather trends easily. Therefore, I tried 7-years MA, 10-years MA and 14-years MA for comparing Casablanca temperature and global temperature. I picked ***14-years MA*** because the graph was informative and less noisy (**see the figure 2**).

For calculate the **14-years moving average** of the Casablanca data and global data, I used the following formula ***=average(E2:E15)*** and then I dragged down till the last cell.

Now the data is ready to use it for visualization.

	A	B	C	D	E	F	G	H
1	city	country	year	avg_temp_Casablanca	14-years MA_Casablanca	avg_temp_Global	14-years MA_Global	
2	Casablanca	Morocco	1783	15,67		7,68		
3	Casablanca	Morocco	1784	18,4		7,86		
4	Casablanca	Morocco	1785	19,57		7,36		
5	Casablanca	Morocco	1786	17,17		8,26		
6	Casablanca	Morocco	1787	17,82		8,03		
7	Casablanca	Morocco	1788	9,14		8,45		
8	Casablanca	Morocco	1789	17,09		8,33		
9	Casablanca	Morocco	1790	17,12		7,98		
10	Casablanca	Morocco	1791	17,27		8,23		
11	Casablanca	Morocco	1792	17,2		8,09		
12	Casablanca	Morocco	1793	17,17		8,23		
13	Casablanca	Morocco	1794	16,92		8,53		
14	Casablanca	Morocco	1795	17,34		8,35		
15	Casablanca	Morocco	1796	17,12	16,78571429	8,27	8,117857143	
16	Casablanca	Morocco	1797	16,94	16,87642857	8,51	8,177142857	
17	Casablanca	Morocco	1798	17,36	16,80214286	8,67	8,235	
18	Casablanca	Morocco	1799	17,18	16,63142857	8,51	8,317142857	
19	Casablanca	Morocco	1800	17,66	16,66642857	8,48	8,332857143	
20	Casablanca	Morocco	1801	17,43	16,63857143	8,59	8,372857143	
21	Casablanca	Morocco	1802	17,65	17,24642857	8,58	8,382142857	
22	Casablanca	Morocco	1803	17,77	17,295	8,5	8,394285714	
23	Casablanca	Morocco	1804	17,78	17,34214286	8,84	8,455714286	
24	Casablanca	Morocco	1805	17,24	17,34	8,56	8,479285714	
25	Casablanca	Morocco	1806	17,13	17,335	8,43	8,503571429	
26	Casablanca	Morocco	1807	16,87	17,31357143	8,28	8,507142857	
27	Casablanca	Morocco	1808	16,3	17,26928571	7,63	8,442857143	

casablanca_data | 7-years MA | 10-years MA | 14-years MA

Figure 1 : 14-years moving average of Casablanca/Global temperatures

From the data prepared, the following graphs are generated:

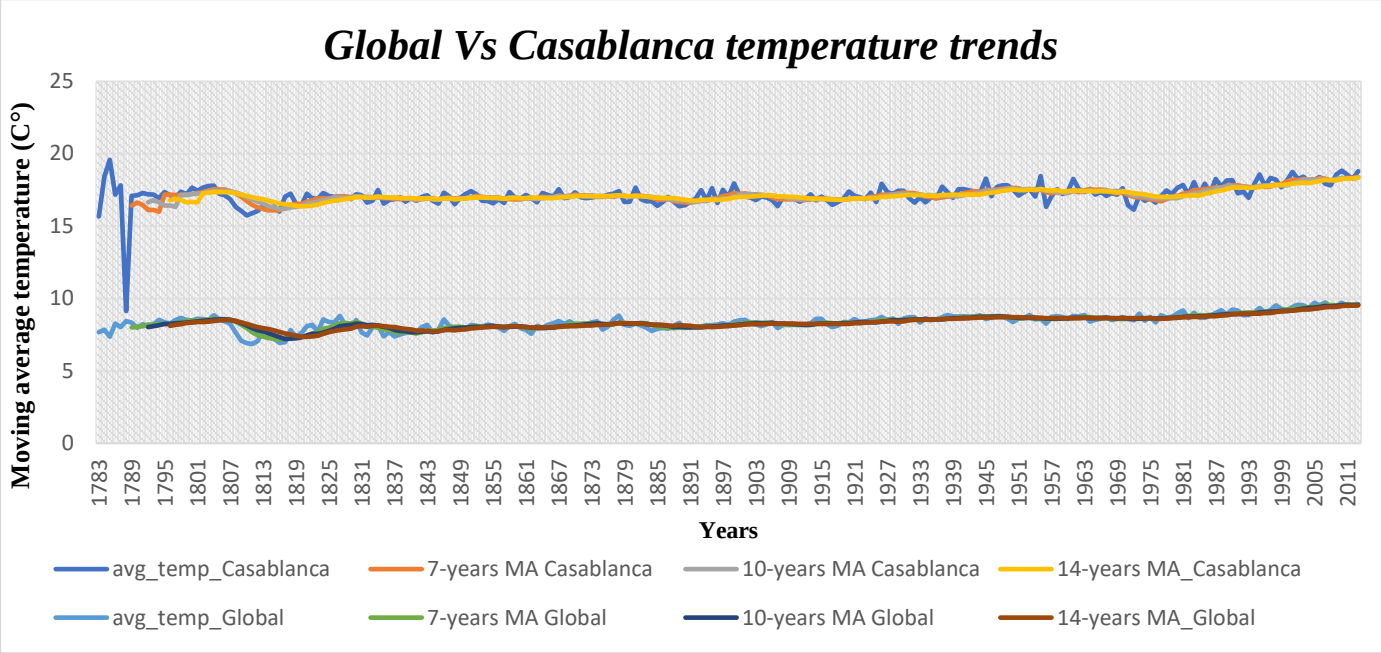


Figure 2 : Casablanca vs Global moving average temperature (7-years, 10-years and 14-years MA)

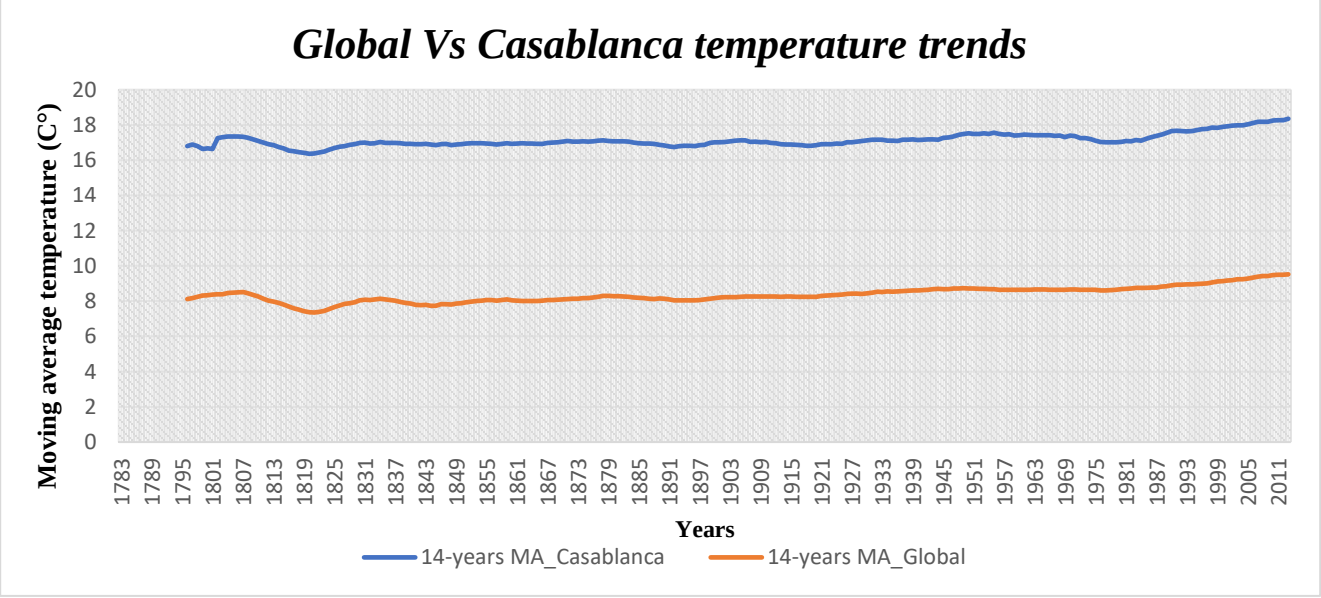


Figure 3 : Casablanca vs Global moving average temperature (14-years MA)

In addition, to know how much data is varied, I measured the spread by calculating the range (R) and the interquartile range (IQR) using the following formulas:

- **R = max value – min value**
- **IQR = Q3 – Q1**

The results are listed below:

	Casablanca	Global
Q4	**19,57**	**9,73**
Q3	**17,465**	**8,7**
Q2	**17,1**	**8,38**
Q1	**16,86**	**8,09**
Q0	**9,14**	**6,86**
Range	**10,43**	**2,87**
IQR	**0,605**	**0,61**

5. Observation

- From the graphs (figure 2 & 3) we can conclude that Casablanca temperature is observed to be hotter than the global temperature. This difference has been consistent over time.
- The graphs show increase in the temperature with time for the both of data (Casablanca and Global). However, Casablanca's average temperature vary in range of 10.43 while global average temperature varies in range of 2.87.
- The IQR is larger in global data (IQR = 0.61), which reflect how the average temperature seemed to vary more from year to year in global world than in Casablanca city.
- Overall trend looks like the word getting slowly hotter over the last few hundred years.

References

https://github.com/khaledimad/Explore-Weather-Trends

https://medium.com/@sofi.prz.m/exploring-weather-trends-7b0418489c0c