Data Analysis Project 1 - Exploring Weather Trends

UDACITY

Student Name: Tadhi Al-Ali

Submit Date: Sunday, 8 September 2019

Abstract:

The goal of this project is to analyze local and global temperature data and compare the temperature trends where I live to overall global temperature trends. Therefore, I choose the local temperature of Riyadh city that located at Saudi Arabia and analyze it with the global temperature data and compared to it. I extract the data by using SQL workspace from temperature database to exported into CSV. Moreover, I use Microsoft excel to calculate the moving average, make line chart and make observation through data visualizations. The result show that, the both line charts of 10 year moving average temperature global and Riyadh city had hotter weather and increasing in the trend temperature.

Objectives:

- Analyze local and global temperature data and compared to the temperature trends.
- Extract the data set from the database by using SQL and exported into CSV.
- Creating a line chart visualization that compares Riyadh city temperatures with the global temperatures.
- Making observation based on the line chart visualization.

Process:

Data Extraction:

I was able to extract data from the database to export temperature data for the world and city that I live on it. Therefore, I find the list of cities and countries by interacting to the database through writing two SQL queries, one of them is to extract the city level data and the other to extract the global data.

A- Database Schema:

There are three tables in the database:

city_list	Contains a list of cities and countries in the database.
city_data	Contains the average temperatures for each city by year.
global_data	Contains the average global temperatures by year.

So, these are the SQL query I used:

1- Query used to view cities and countries in the city_list table and look for the city of choice:

Select * From city_list;

Figure 1

2- After seeing the city of choice (Riyadh city) in the table, I filter the weather data from city_data table. So, the Query I used to view the level of data which contains the average temperatures for Riyadh city by year in Saudi Arabia is:

Select * From city_data Where city='Riyadh' And country='Saudi Arabia';

Then, I export the CSV file.

Figure 2

3- Lastly, I used global_data to extract the global temperatures data by year:
   Select * From global_data;
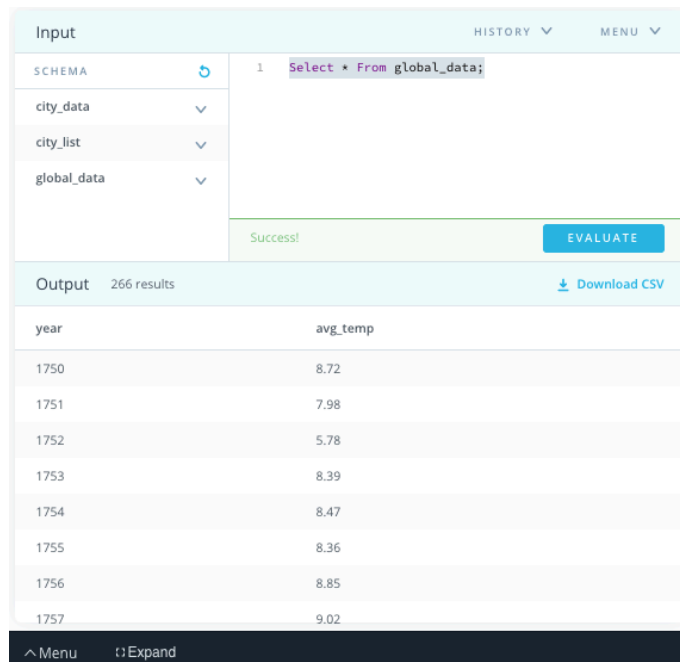
Then, I export the CSV file.

Figure 3

Open up the CSV:

Then, while using each SQL query to extract the data I downloaded the results as CSV files by using Microsoft Excel.

Create a line chart (Moving Averages):

Moreover, I have to calculate the moving average to smooth data and compare Riyadh city temperatures with the global temperatures as the following steps:

1- First step, is to open the global data sheets as the figure below:

Figure 4

2- Second, is to calculate the moving average to observe trends in temperatures by adding new raw named 10-year MA. So, I used 10 years moving average to get smooth line chart:

- Moving Average Formula: - Result:
=AVERAGE(B2:B11)

	A	B	C	D
SUM		fx	=AVERAGE(B2:B11)	
	A	B	C	D
1	year	global_avg_temp	10-year MA	
2	1750	8.72		
3	1751	7.98		
4	1752	5.78		
5	1753	8.39		
6	1754	8.47		
7	1755	8.36		
8	1756	8.85		
9	1757	9.02		
10	1758	6.74		
11	1759	7.99	=AVERAGE(B2:B11)	
12	1760	7.19		
13	1761	8.77		
14	1762	8.61		
15	1763	7.5		
16	1764	8.4		
17	1765	8.25		
18	1766	8.41		
19	1767	8.22		
20	1768	6.78		

Figure 5

	A	B	C
A1		fx	year
	A	B	C
1	year	global_avg_temp	10-year MA
2	1750	8.72	
3	1751	7.98	
4	1752	5.78	
5	1753	8.39	
6	1754	8.47	
7	1755	8.36	
8	1756	8.85	
9	1757	9.02	
10	1758	6.74	
11	1759	7.99	8.03
12	1760	7.19	
13	1761	8.77	
14	1762	8.61	
15	1763	7.5	
16	1764	8.4	
17	1765	8.25	
18	1766	8.41	
19	1767	8.22	
20	1768	6.78	

Figure 6

- Get the 10-year global moving average of the rest of data:

	A	B	C
A1		fx	year
	A	B	C
1	year	global_avg_temp	10-year MA
2	1750	8.72	
3	1751	7.98	
4	1752	5.78	
5	1753	8.39	
6	1754	8.47	
7	1755	8.36	
8	1756	8.85	
9	1757	9.02	
10	1758	6.74	
11	1759	7.99	8.03
12	1760	7.19	7.877
13	1761	8.77	7.956
14	1762	8.61	8.239
15	1763	7.5	8.15
16	1764	8.4	8.143
17	1765	8.25	8.132
18	1766	8.41	8.088
19	1767	8.22	8.008
20	1768	6.78	8.012
21	1769	7.69	7.982
22	1770	7.69	8.032
23	1771	7.85	7.94
24	1772	8.19	7.898
25	1773	8.22	7.97
26	1774	8.77	8.007
27	1775	9.18	8.1
28	1776	8.3	8.089
29	1777	8.26	8.093
30	1778	8.54	8.269
31	1779	8.98	8.398

Figure 7

3- Then, getting the 10-year moving average of Riyadh city:

	A	B	C	D	E
					fx Riyadh
1	year	city	country	avg_temp	10 year - Riyadh Moving Average
2	1843	Riyadh	Saudi Arabia	24.74	
3	1844	Riyadh	Saudi Arabia	15.45	
4	1845	Riyadh	Saudi Arabia	20.82	
5	1846	Riyadh	Saudi Arabia		
6	1847	Riyadh	Saudi Arabia		
7	1848	Riyadh	Saudi Arabia	24.56	
8	1849	Riyadh	Saudi Arabia	24.8	
9	1850	Riyadh	Saudi Arabia	24.34	
10	1851	Riyadh	Saudi Arabia	25.03	
11	1852	Riyadh	Saudi Arabia	24.85	23.07
12	1853	Riyadh	Saudi Arabia	24.93	23.10
13	1854	Riyadh	Saudi Arabia	24.72	24.26
14	1855	Riyadh	Saudi Arabia	24.92	24.77
15	1856	Riyadh	Saudi Arabia	24.57	24.75
16	1857	Riyadh	Saudi Arabia	24.26	24.70
17	1858	Riyadh	Saudi Arabia	25.01	24.74
18	1859	Riyadh	Saudi Arabia	24.95	24.76
19	1860	Riyadh	Saudi Arabia	24.94	24.82
20	1861	Riyadh	Saudi Arabia	24.13	24.73
21	1862	Riyadh	Saudi Arabia	23.77	24.62
22	1863	Riyadh	Saudi Arabia	24.28	24.56
23	1864	Riyadh	Saudi Arabia	25.03	24.59
24	1865	Riyadh	Saudi Arabia	25.23	24.62
25	1866	Riyadh	Saudi Arabia	24.92	24.65
26	1867	Riyadh	Saudi Arabia	25.22	24.75
27	1868	Riyadh	Saudi Arabia	25	24.75
28	1869	Riyadh	Saudi Arabia	25.3	24.78

Figure 8

4- Finally, I make the graph of line chart for the Riyadh moving average temperature and global moving average temperature:
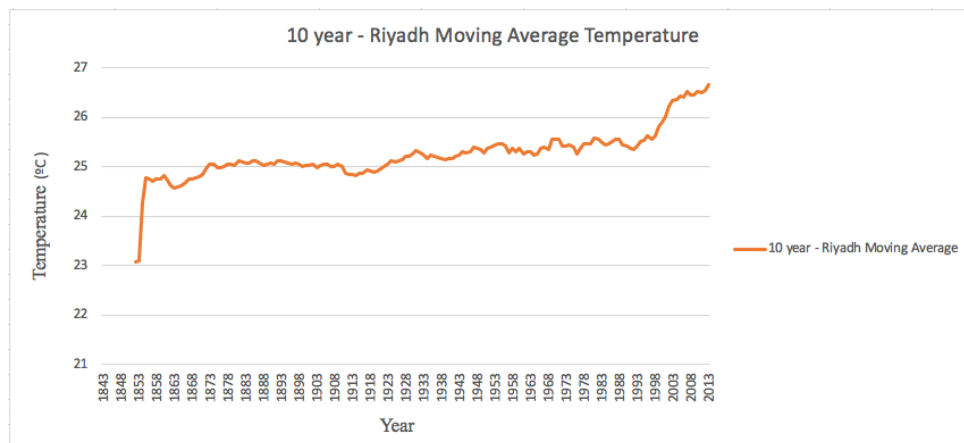
Line Chart of Riyadh Moving Average Temperature:

Figure 9

Line Chart of Global Moving Average Temperature:
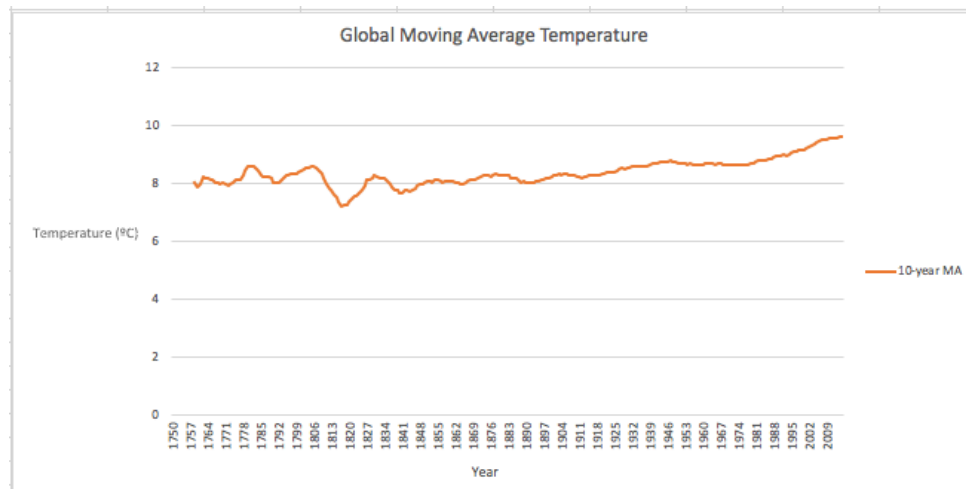

Figure 10

Analysis and Conclusion:

Observations:

A- For figure 9 - Line Chart of Riyadh Moving Average Temperature:

1- The trend line of Riyadh moving average temperature shows increasing over the years. So, the weather getting hotter.

2- The time period from 1852 to 1855 shows the biggest increasing trend in temperature from 23.07 ºC to 24.77 ºC.

3- The minimum temperature of Riyadh city was 15.45 ºC at 1844.

4- The maximum temperature of Riyadh city was 27.78 ºC at 2013.

B- For figure 10 – Line Chart of Global Moving Average Temperature:

1- The trend line of global moving average temperature shows increasing over the years. So, the weather getting hotter.

2- The time period from 1807 to 1817 shows decreasing in global temperature from 8.54 ºC to 7.20 ºC then the trend started to increased later.

3- The minimum global temperature was 5.78 ºC at 1752.

4- The maximum global temperature was 9.83 ºC at 2015.

C- Finally, the trend line of the temperature increasing and the weather getting hotter over the years while you looking at the both line charts for the 10- year moving average temperature of global and Riyadh city.