Data Analyst Nanodegree Program

Project 1: Exploring Weather Trends

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Idea:

Analyze local and global temperature data and compare the temperature trends where I live to overall global temperature trends.

Goal:

Create a visualization and prepare a write up describing the **similarities** and **differences** between global temperature trends and temperature trends in the closest big city to where you live.

Steps:

- **Extract data from a database using a SQL query**

- Write a SQL query to extract the city level data. Export to CSV.
- Write a SQL query to extract the global data. Export to CSV.

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

    Tool: Number App for Mac and SQL

- **Calculate a moving average in a spreadsheet**

  - How did you calculate the moving average?

    Using AVERAGE formula for 7 years.

- **Create a line chart in a spreadsheet**

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

    Comparing the average temperature of the city I live in compared to the rest of the world.
    Horizontal line (X): years
    Vertical line: Temperature

1- Extract data from a database using a SQL query

- Write a SQL query to extract the city level data. Export to CSV.

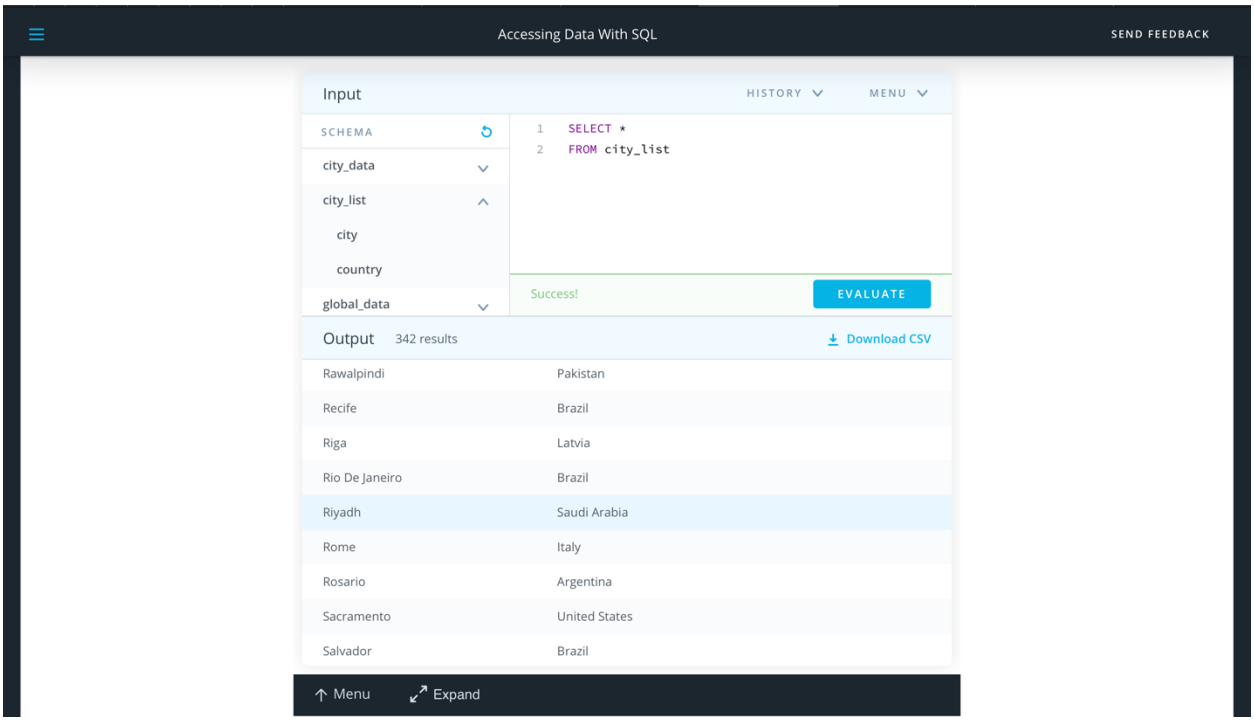
Using the command:

```
SELECT *
FROM city_list
```

All the existing countries were presented to verify the existence of the country in which I live (Riyadh) to compare it with the global temperature.
It is possible to customize more and use WHERE cluse:

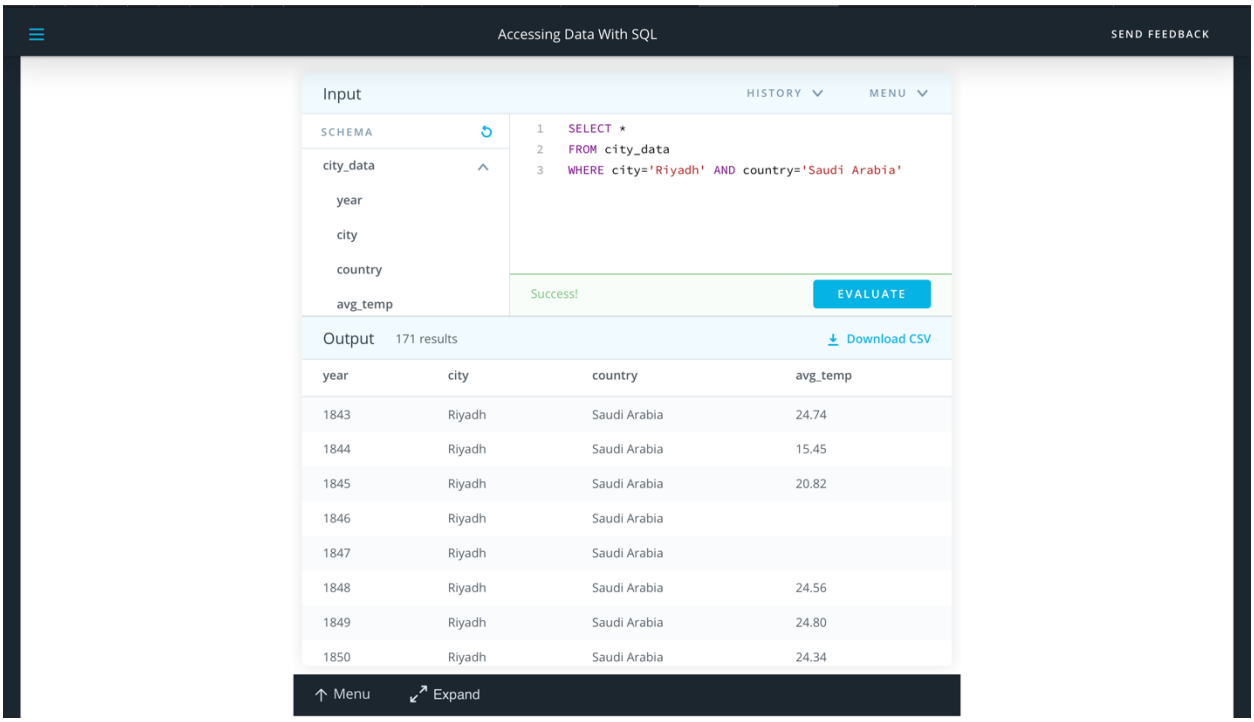
```
SELECT *
FROM city_list
WHERE city='Riyadh'
```

Finally, download the data in CSV format.



The city_data table displays the data for each city, and to display the data for the city of Riyadh I used the command:

```
SELECT *
FROM city_list
WHERE city='Riyadh' AND country='Saudi Arabia'
```



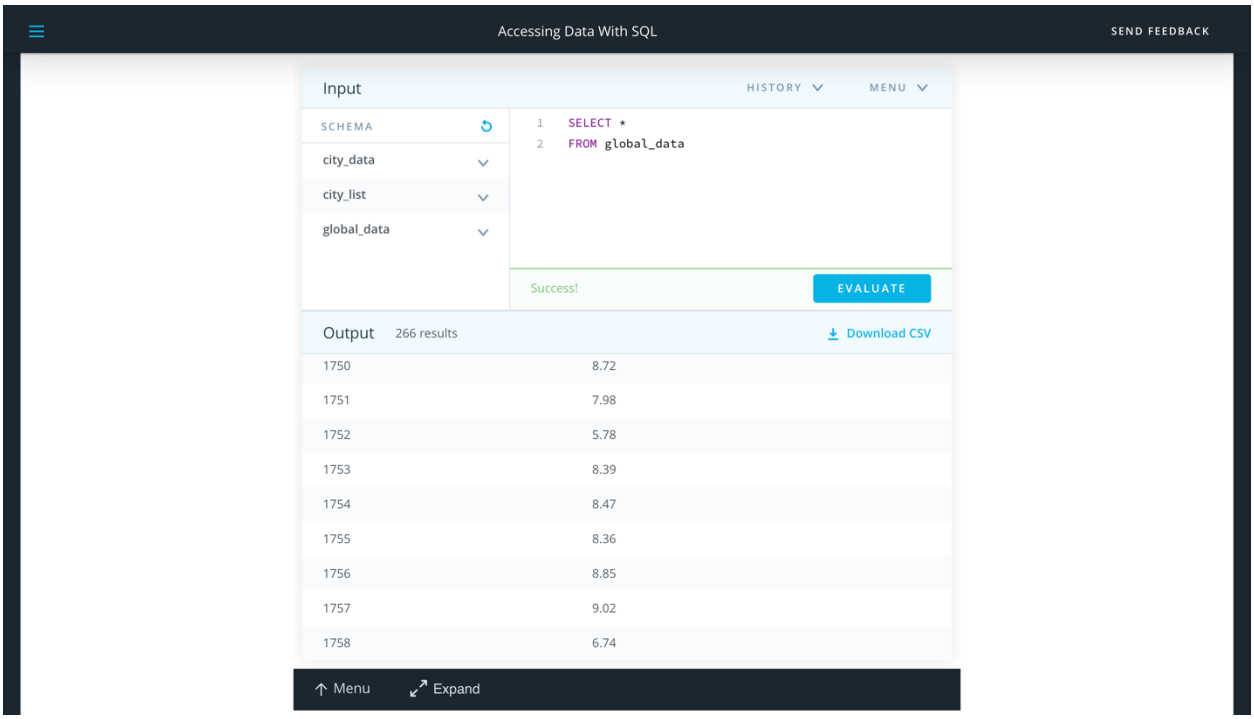
The results showed the average temperatures of Riyadh in every year from 1843 until 2013.

- Write a SQL query to extract the global data. Export to CSV.

Using the command:

```
SELECT *
FROM global_data
```

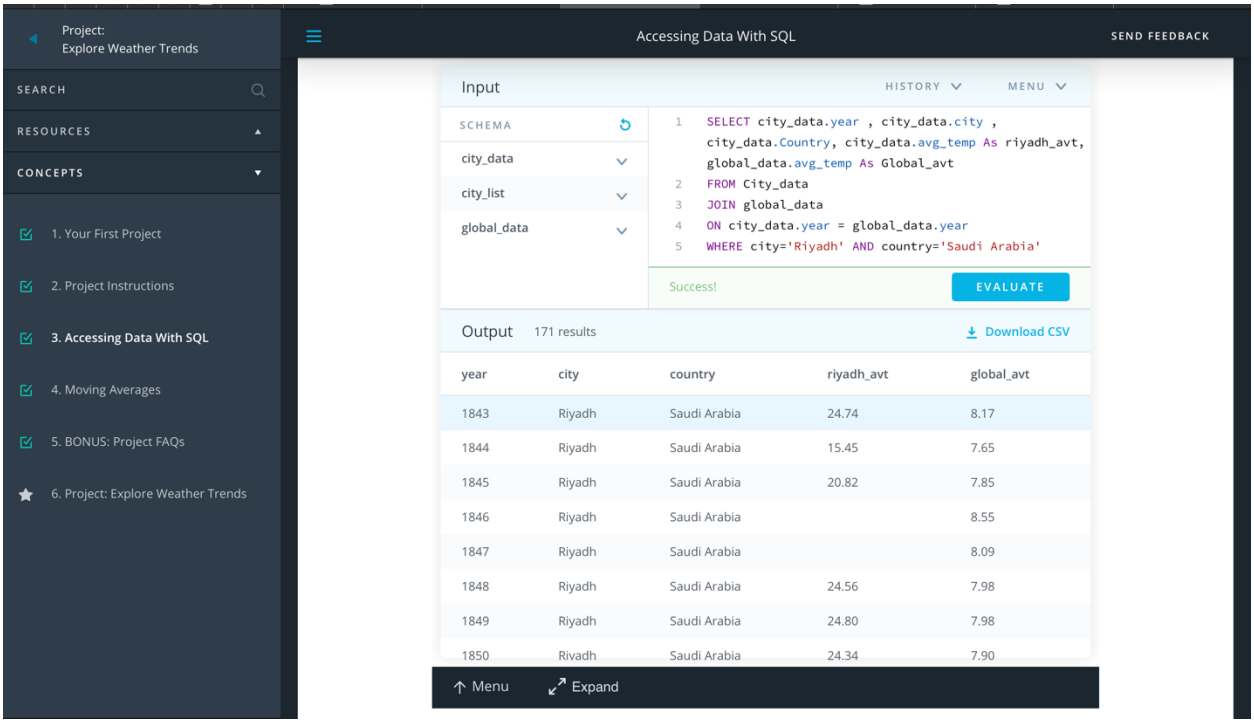
The data in the global table was extracted and saved as CSV file.



Join Tables and download the CSV file:

To work with the data more easily, I merged the two tables City_data and global_data, using JOIN command, and download one complete CSV file.

```
SELECT city_data.year , city_data.city , city_data.Country, city_data.avg_temp As riyadh_avt,
global_data.avg_temp As Global_avt
FROM City_data
JOIN global_data
ON city_data.year = global_data.year
WHERE city='Riyadh' AND country='Saudi Arabia'
```



2- Calculate a moving average in a spreadsheet

Using Number App for MAC , the csv file open and manipulated. The CSV fil display a dataset that contain local (Riyadh)and global data.

Moving Average with 7 years was calculated for local (L7- day MA) and global (G7 -day MA) data.

Formula: =AVERAGE(D2:D8)

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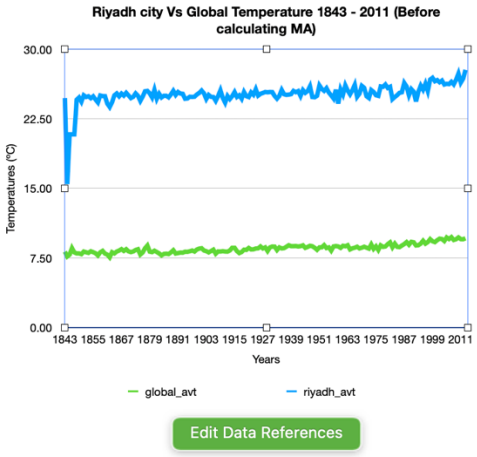
	r	city	country	riyadh_avt	L 7-day MA	global_avt	G 7-day MA
2	3	Riyadh	Saudi Arabia	24.74		8.17	
3	4	Riyadh	Saudi Arabia	15.45		7.65	
4	5	Riyadh	Saudi Arabia	20.82		7.85	
5	6	Riyadh	Saudi Arabia	20.82		8.55	
6	7	Riyadh	Saudi Arabia	20.82		8.09	
7	8	Riyadh	Saudi Arabia	24.56		7.98	
8	9	Riyadh	Saudi Arabia	24.80		7.98	
9	0	Riyadh	Saudi Arabia	24.34	24.77	7.90	8.08
10	1	Riyadh	Saudi Arabia	25.03	24.75	8.18	8.06
11	2	Riyadh	Saudi Arabia	24.85	24.75	8.10	8.05
12	3	Riyadh	Saudi Arabia	24.93	24.77	8.04	8.07
13	4	Riyadh	Saudi Arabia	24.72	24.77	8.21	8.06
14	5	Riyadh	Saudi Arabia	24.92	24.68	8.11	8.00
15	6	Riyadh	Saudi Arabia	24.57	24.52	8.00	7.93
16	7	Riyadh	Saudi Arabia	24.26	24.48	7.76	7.94
17	8	Riyadh	Saudi Arabia	25.01	24.59	8.10	7.97
18	9	Riyadh	Saudi Arabia	24.95	24.62	8.25	7.98
19	0	Riyadh	Saudi Arabia	24.94	24.61	7.96	7.99
20	1	Riyadh	Saudi Arabia	24.13	24.65	7.85	8.06
21	2	Riyadh	Saudi Arabia	23.77	24.78	7.56	8.12
22	3	Riyadh	Saudi Arabia	24.28	25.00	8.11	8.24
23	4	Riyadh	Saudi Arabia	25.03	25.10	7.98	8.25
24	5	Riyadh	Saudi Arabia	25.23	25.06	8.18	8.27
25	6	Riyadh	Saudi Arabia	24.92	25.01	8.29	8.27
26	7	Riyadh	Saudi Arabia	25.22	25.05	8.44	8.28
27	8	Riyadh	Saudi Arabia	25.00	25.02	8.25	8.28
28	9	Riyadh	Saudi Arabia	25.30	24.94	8.43	8.23

Compare local and global temperatures **Before** calculating Moving Average:

year	city	country	riyadh_avt	Local 7-Year MA	global_avt	Global 7-Year MA
1843	Riyadh	Saudi Arabia	24.74		8.17	
1844	Riyadh	Saudi Arabia	15.45		7.65	
1845	Riyadh	Saudi Arabia	20.82		7.85	
1846	Riyadh	Saudi Arabia	20.82		8.55	
1847	Riyadh	Saudi Arabia	20.82		8.09	
1848	Riyadh	Saudi Arabia	24.56		7.98	
1849	Riyadh	Saudi Arabia	24.80		7.98	
1850	Riyadh	Saudi Arabia	24.34	24.77	7.90	8.08
1851	Riyadh	Saudi Arabia	25.03	24.75	8.18	8.06
1852	Riyadh	Saudi Arabia	24.85	24.75	8.10	8.05
1853	Riyadh	Saudi Arabia	24.93	24.77	8.04	8.07
1854	Riyadh	Saudi Arabia	24.72	24.77	8.21	8.06
1855	Riyadh	Saudi Arabia	24.92	24.68	8.11	8.00
1856	Riyadh	Saudi Arabia	24.57	24.52	8.00	7.93
1857	Riyadh	Saudi Arabia	24.26	24.48	7.76	7.94
1858	Riyadh	Saudi Arabia	25.01	24.59	8.10	7.97
1859	Riyadh	Saudi Arabia	24.95	24.62	8.25	7.98
1860	Riyadh	Saudi Arabia	24.94	24.61	7.96	7.99
1861	Riyadh	Saudi Arabia	24.13	24.65	7.85	8.06
1862	Riyadh	Saudi Arabia	23.77	24.78	7.56	8.12
1863	Riyadh	Saudi Arabia	24.28	25.00	8.11	8.24
1864	Riyadh	Saudi Arabia	25.03	25.10	7.98	8.25
1865	Riyadh	Saudi Arabia	25.23	25.06	8.18	8.27
1866	Riyadh	Saudi Arabia	24.92	25.01	8.29	8.27
1867	Riyadh	Saudi Arabia	25.22	25.05	8.44	8.28
1868	Riyadh	Saudi Arabia	25.00	25.02	8.25	8.28
1869	Riyadh	Saudi Arabia	25.30	24.94	8.43	8.23

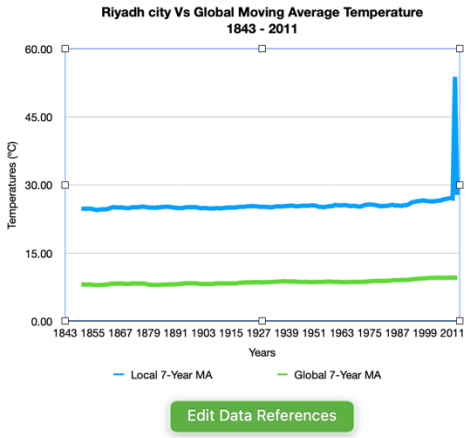


The graph shows the temperature level of Riyadh compared to the global world before calculating MA. It shows that the temperature of the city of Riyadh was higher than the world during the specified period of time from 1843 until 2011.

Compare local and global temperatures **After** calculating Moving Average:

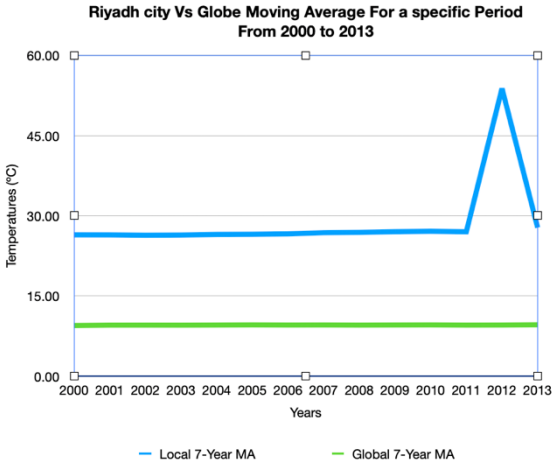
results-5

year	city	country	riyadh_avt	Local 7-Year MA	global_avt	Global 7-Year MA
1843	Riyadh	Saudi Arabia	24.74		8.17	
1844	Riyadh	Saudi Arabia	15.45		7.65	
1845	Riyadh	Saudi Arabia	20.82		7.85	
1846	Riyadh	Saudi Arabia	20.82		8.55	
1847	Riyadh	Saudi Arabia	20.82		8.09	
1848	Riyadh	Saudi Arabia	24.56		7.98	
1849	Riyadh	Saudi Arabia	24.80		7.98	
1850	Riyadh	Saudi Arabia	24.34	24.77	7.90	8.08
1851	Riyadh	Saudi Arabia	25.03	24.75	8.18	8.06
1852	Riyadh	Saudi Arabia	24.85	24.75	8.10	8.05
1853	Riyadh	Saudi Arabia	24.93	24.77	8.04	8.07
1854	Riyadh	Saudi Arabia	24.72	24.77	8.21	8.06
1855	Riyadh	Saudi Arabia	24.92	24.68	8.11	8.00
1856	Riyadh	Saudi Arabia	24.57	24.52	8.00	7.93
1857	Riyadh	Saudi Arabia	24.26	24.48	7.76	7.94
1858	Riyadh	Saudi Arabia	25.01	24.59	8.10	7.97
1859	Riyadh	Saudi Arabia	24.95	24.62	8.25	7.98
1860	Riyadh	Saudi Arabia	24.94	24.61	7.96	7.99
1861	Riyadh	Saudi Arabia	24.13	24.65	7.85	8.06
1862	Riyadh	Saudi Arabia	23.77	24.78	7.56	8.12
1863	Riyadh	Saudi Arabia	24.28	25.00	8.11	8.24
1864	Riyadh	Saudi Arabia	25.03	25.10	7.98	8.25
1865	Riyadh	Saudi Arabia	25.23	25.06	8.18	8.27
1866	Riyadh	Saudi Arabia	24.92	25.01	8.29	8.27



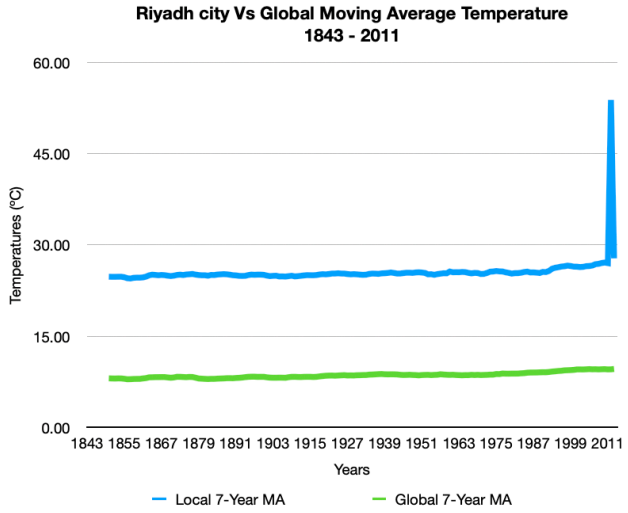
Plot Moving Average for a specific period from (2000 – 2013):

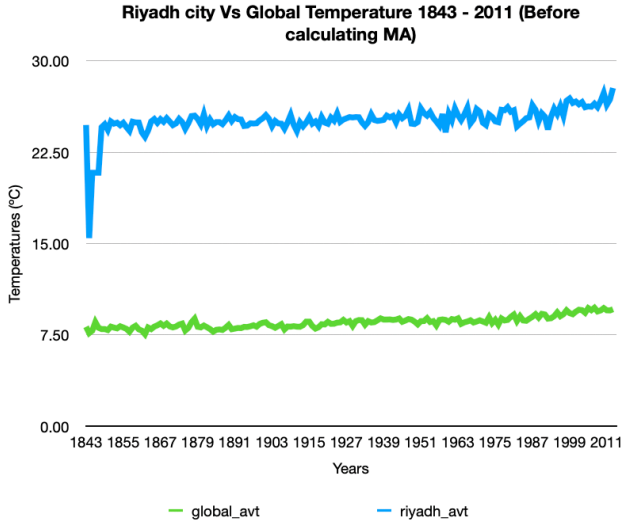
1994	Riyadh	Saudi Arabia	26.08	26.24	9.04	9.23
1995	Riyadh	Saudi Arabia	25.64	26.33	9.35	9.29
1996	Riyadh	Saudi Arabia	26.28	26.44	9.04	9.32
1997	Riyadh	Saudi Arabia	25.49	26.49	9.20	9.39
1998	Riyadh	Saudi Arabia	26.73	26.59	9.52	9.41
1999	Riyadh	Saudi Arabia	26.92	26.52	9.29	9.43
2000	Riyadh	Saudi Arabia	26.55	26.43	9.20	9.47
2001	Riyadh	Saudi Arabia	26.67	26.42	9.41	9.54
2002	Riyadh	Saudi Arabia	26.44	26.35	9.57	9.54
2003	Riyadh	Saudi Arabia	26.62	26.39	9.53	9.54
2004	Riyadh	Saudi Arabia	26.20	26.50	9.32	9.56
2005	Riyadh	Saudi Arabia	26.27	26.53	9.70	9.59
2006	Riyadh	Saudi Arabia	26.24	26.61	9.53	9.56
2007	Riyadh	Saudi Arabia	26.49	26.83	9.73	9.57
2008	Riyadh	Saudi Arabia	26.21	26.88	9.43	9.55
2009	Riyadh	Saudi Arabia	26.71	27.02	9.51	9.57
2010	Riyadh	Saudi Arabia	27.37	27.10	9.70	9.59
2011	Riyadh	Saudi Arabia	26.40	27.00	9.52	9.55
2012	Riyadh	Saudi Arabia	26.83	53.80	9.51	9.56
2013	Riyadh	Saudi Arabia	27.78	27.78	9.61	9.61



3- Create a line chart in a spreadsheet

- Is your city hotter or cooler on average compared to the global average? Has the difference been consistent over time?
  As shown in the line chart, my city is hotter than the global temperature, and the difference has been consistent over time





- "How do the changes in your city's temperatures over time compare to the changes in the global average?"
  From the graph, it is clear that the temperature change in my city is always high, as I live in a desert area.

- What does the overall trend look like? Is the world getting hotter or cooler? Has the trend been consistent over the last few hundred years?

There is a very small rise in temperature for my city and the rest of the world, but in general the change is constant for a long time

Observations:

- From the graph, I Observed the temperature of Riyadh is higher than the global temperature.

- The temperature of my city is always between 17 ºC to 28 ºC , while the global is between 7 ºC to 9 ºC.

- There is a very big difference between Riyadh and global temperature

- The average temperature in Riyadh has been somewhat constant since 1855, and it is considered a hot desert climate