Project1

Analysis of local and global temperature data on the Celsius scale

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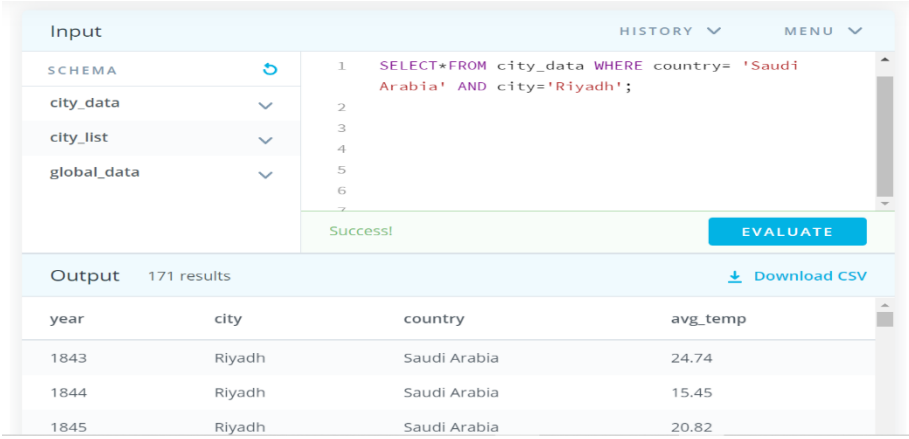
Project Objective:

analyze local and global temperature data on the Celsius scale and compare the temperature trends where you live to overall global temperature trends.

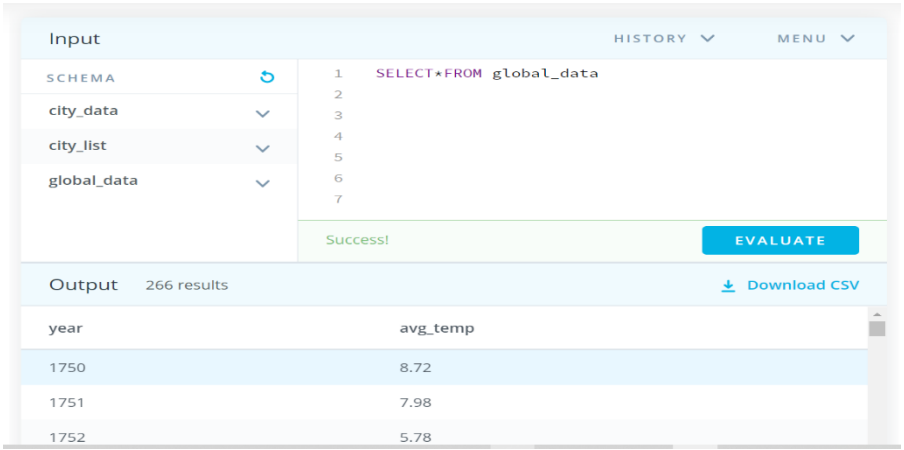
Used equipments: SQL - Excel.

Code SQL:

SELECT*FROM city_data WHERE country= 'Saudi Arabia' AND city='Riyadh';



SELECT*FROM global_data



The research will answer the following questions:

Q1- Is Riyadh hotter or colder on average compared to the global average?

Q2- Is the difference in average temperature constant over time?

Q3- How do changes in Riyadh city temperatures over time compare to changes in the global average?

Q4- What does the general trend look like? Is the world getting hotter or colder? Has the trend been consistent over the past few hundred years?

Display data:

	A	B	C
1	Year	Globel	Riyadh city
2	1846	8.55	25.3
3	1847	8.09	25.3
4	1848	7.98	24.56
5	1849	7.98	24.8
6	1850	7.9	24.34
7	1851	8.18	25.03
8	1852	8.1	24.85
9	1853	8.04	24.93
10	1854	8.21	24.72
11	1855	8.11	24.92
12	1856	8	24.57
13	1857	7.76	24.26
14	1858	8.1	25.01
15	1859	8.25	24.95
16	1860	7.96	24.94
17	1861	7.85	24.13
18	1862	7.56	23.77
19	1863	8.11	24.28
20	1864	7.98	25.03
21	1865	8.18	25.23
22	1866	8.29	24.92
23	1867	8.44	25.22
24	1868	8.25	25
25	1869	8.43	25.3
26	1870	8.2	25.02
27	1871	8.12	24.73
28	1872	8.19	24.87
29	1873	8.35	25.24
30	1874	8.43	24.98
31	1875	7.86	24.43
32	1876	8.08	24.89
33	1877	8.54	25.47
34	1878	8.83	25.51
35	1879	8.17	25.24
36	1880	8.12	24.8
37	1881	8.27	25.63
38	1882	8.13	24.66
39	1883	7.98	25.19
40	1884	7.77	24.8
41	1885	7.92	24.98
42	1886	7.95	24.98
43	1887	7.91	24.81
44	1888	8.09	25.13
45	1889	8.32	25.52
46	1890	7.97	25.07
47	1891	8.02	25.39
48	1892	8.07	25.22
49	1893	8.06	25.19
50	1894	8.16	24.66
51	1895	8.15	24.69
52	1896	8.21	24.88
53	1897	8.29	24.86
54	1898	8.18	24.88
55	1899	8.4	25.12
56	1900	8.5	25.29
57	1901	8.54	25.55

	A	B	C
58	1899	8.4	25.12
59	1900	8.5	25.29
60	1901	8.54	25.55
61	1902	8.3	25.25
62	1903	8.22	24.64
63	1904	8.09	25.07
64	1905	8.23	24.87
65	1906	8.36	24.85
66	1907	7.95	24.44
67	1908	8.19	24.95
68	1909	8.18	25.57
69	1910	8.22	24.75
70	1911	8.18	24.24
71	1912	8.17	24.96
72	1913	8.3	24.63
73	1914	8.59	24.94
74	1915	8.59	25.36
75	1916	8.23	24.85
76	1917	8.02	25.03
77	1918	8.13	24.66
78	1919	8.36	25.39
79	1920	8.36	24.94
80	1921	8.57	24.84
81	1922	8.41	25.35
82	1923	8.42	25.1
83	1924	8.51	25.69
84	1925	8.53	25
85	1926	8.73	25.19
86	1927	8.52	25.29
87	1928	8.63	25.39
88	1929	8.24	25.36
89	1930	8.63	25.39
90	1931	8.72	25.36
91	1932	8.71	24.96
92	1933	8.34	24.67
93	1934	8.63	24.97
94	1935	8.52	25.61
95	1936	8.55	25.15
96	1937	8.7	25.08
97	1938	8.86	25.11
98	1939	8.76	25.16
99	1940	8.76	25.51
100	1941	8.77	25.37
101	1942	8.73	25.49
102	1943	8.76	24.96
103	1944	8.85	25.6
104	1945	8.58	25.3
105	1946	8.68	25.49
106	1947	8.8	26
107	1948	8.75	24.85
108	1949	8.59	24.82
109	1950	8.37	24.96
110	1951	8.63	26.1
111	1952	8.64	25.72
112	1953	8.87	25.51
113	1954	8.56	25.8
114	1955	8.63	25.33
115	1956	8.28	25.02
116	1957	8.73	24.69

	A	B	C
117	1958	8.77	25.64
118	1959	8.73	24.14
119	1960	8.58	25.67
120	1961	8.8	25.12
121	1962	8.75	26.1
122	1963	8.86	25.54
123	1964	8.41	25.14
124	1965	8.53	25.59
125	1966	8.6	26.16
126	1967	8.7	24.87
127	1968	8.52	25.21
128	1969	8.6	26.05
129	1970	8.7	25.84
130	1971	8.6	24.93
131	1972	8.5	24.74
132	1973	8.95	25.6
133	1974	8.47	25.4
134	1975	8.74	25.04
135	1976	8.35	24.97
136	1977	8.85	25.99
137	1978	8.69	25.95
138	1979	8.73	26.2
139	1980	8.98	25.83
140	1981	9.17	25.95
141	1982	8.64	24.62
142	1983	9.03	24.85
143	1984	8.69	25.05
144	1985	8.68	25.3
145	1986	8.83	25.36
146	1987	8.99	26.37
147	1988	9.2	25.99
148	1989	8.92	25.05
149	1990	9.23	25.7
150	1991	9.18	25.43
151	1992	8.64	24.37
152	1993	8.87	25.42
153	1994	9.04	26.06
154	1995	9.35	25.64
155	1996	9.04	26.26
156	1997	9.2	25.49
157	1998	9.52	26.73
158	1999	9.29	26.92
159	2000	9.2	26.55
160	2001	9.41	26.67
161	2002	9.57	26.44
162	2003	9.53	26.62
163	2004	9.32	26.2
164	2005	9.7	26.27
165	2006	9.53	26.24
166	2007	9.73	26.49
167	2008	9.43	26.21
168	2009	9.51	26.71
169	2010	9.7	27.37
170	2011	9.52	26.4
171	2012	9.51	26.83
172	2013	9.61	27.78

Data cleaning:

- missing data

Finding the missing data shown in the picture by calculating the average for all the previous and following averages for them in the city of Riyadh and considering it as the average for both years.

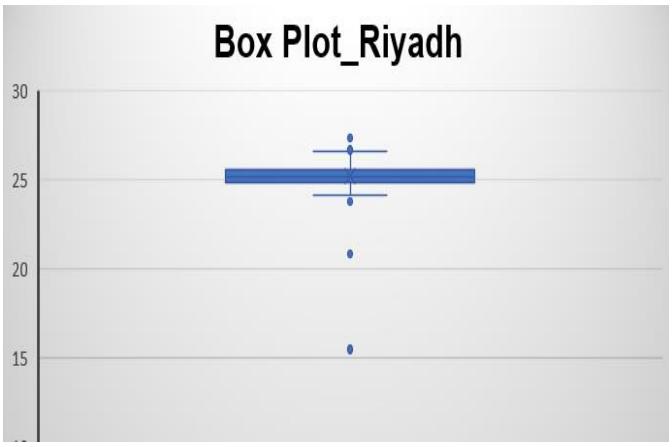
	A	B	C
1	Year	Globel	Riyadh city
2	1846	8.55	25.3
3	1847	8.09	25.3
4	1848	7.98	24.56
5	1849	7.98	24.8
6	1850	7.9	24.34

Average (Riyadh)	=AVERAGE(C4:C169)

- Outliers

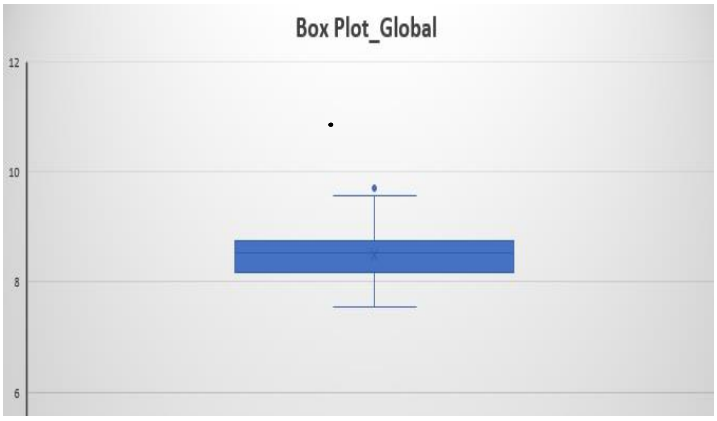
To determine the outliers, I plotted the box plot and through it I was able to find two extreme values and thus the entire row was deleted to preserve the accuracy of the data.

There are also extreme values, but they are very close, so they are not considered extreme values.



Year	Globel	Riyadh city
1843	8.17	24.74
~~1844~~	~~7.65~~	~~15.45~~
~~1845~~	~~7.85~~	~~20.82~~
1846	8.55	25.3
1847	8.09	25.3
1848	7.98	24.56
1849	7.98	24.8
1850	7.9	24.34

There are no extreme values to be taken into account.



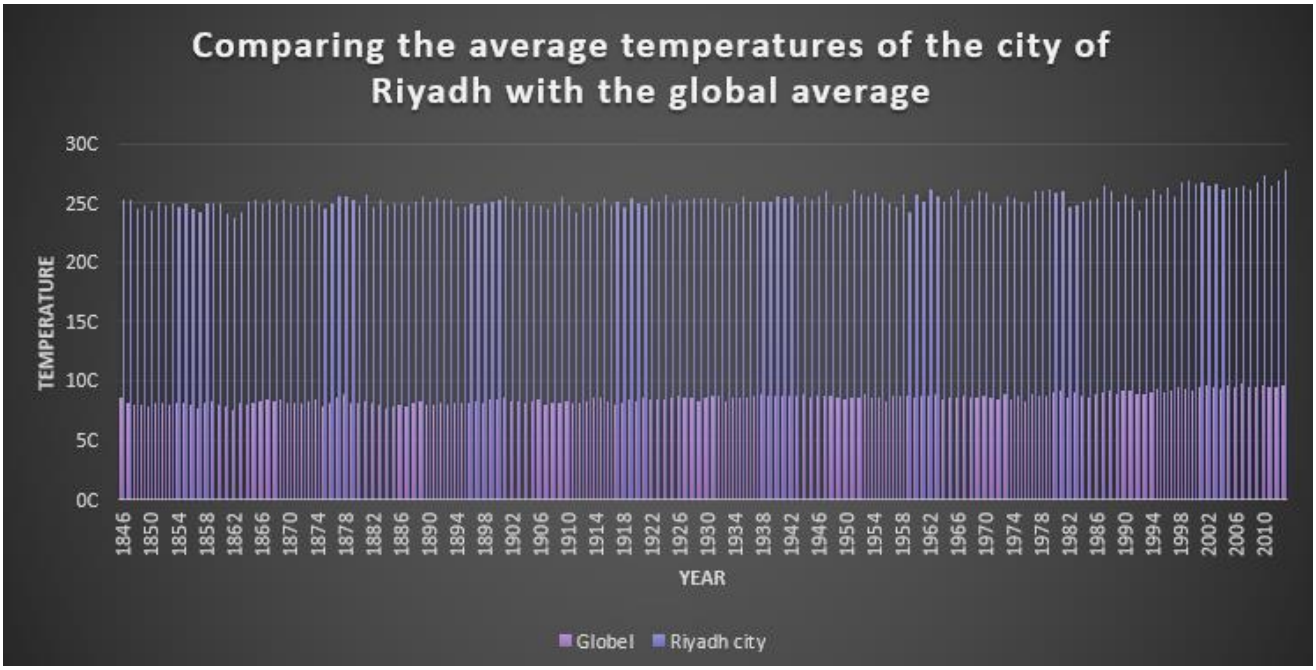
- time gap

Delete year 1843 so that there is no time gap so that the years are arranged year after year with the same difference, which is one year.

Year	Globel	Riyadh city
~~1843~~	~~8.17~~	~~24.74~~
1844	7.65	15.45
1845	7.85	20.82
1846	8.55	25.3
1847	8.09	25.3
1848	7.98	24.56
1849	7.98	24.8
1850	7.9	24.34

Visualize data and draw conclusions:

First: Comparing the average temperatures of the city of Riyadh with the global average



I drew stacked column chart due to its effectiveness in being able to x9fcompare the average temperatures between two or more cities, which clearly shows the highest city.

Through the graph, we note that the average temperatures in Riyadh has increased significantly compared to the average global temperatures.

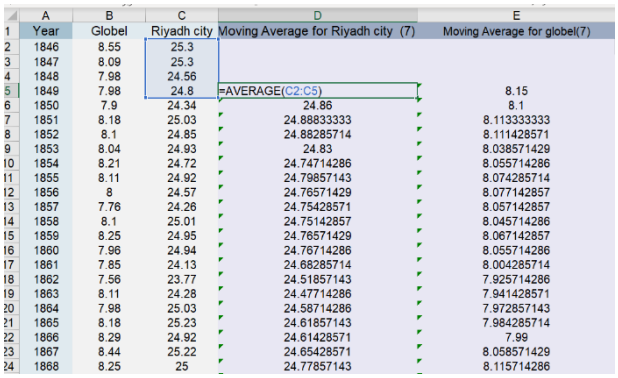
Second: moving average

1- moving average calculation

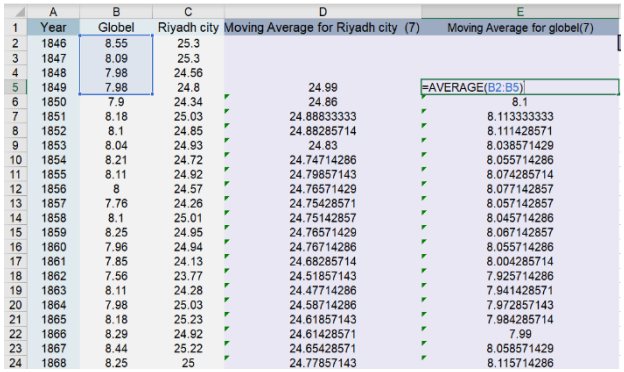
moving average is compute for analyzing data points by creating a series of averages for the different subsets of the full data set.

The moving average is calculated after several steps. First, the number of years for which the moving average is made is determined. Here, I chose seven years for each of Riyadh and the world.

The average is calculated for the first seven years, and then the average is calculated from the second year to the eighth, and this is how it is fully calculated.



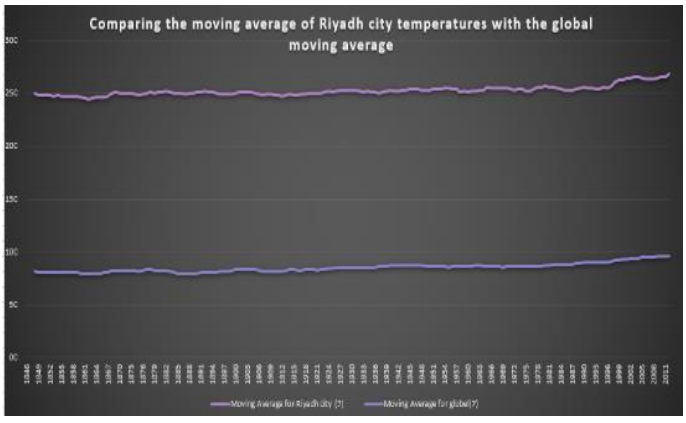
	A	B	C	D	E
1	Year	Globel	Riyadh city	Moving Average for Riyadh city (7)	Moving Average for globel(7)
2	1846	8.55	25.3		
3	1847	8.09	25.3		
4	1848	7.98	24.56		
5	1849	7.98	24.8	=AVERAGE(C2:C5)	8.15
6	1850	7.9	24.34	24.86	8.1
7	1851	8.18	25.03	24.88833333	8.113333333
8	1852	8.1	24.85	24.88285714	8.111428571
9	1853	8.04	24.93	24.83	8.038571429
10	1854	8.21	24.72	24.74714286	8.055714286
11	1855	8.11	24.92	24.79857143	8.074285714
12	1856	8	24.57	24.76571429	8.077142857
13	1857	7.76	24.26	24.75428571	8.057142857
14	1858	8.1	25.01	24.75142857	8.045714286
15	1859	8.25	24.95	24.76571429	8.067142857
16	1860	7.96	24.94	24.76714286	8.055714286
17	1861	7.85	24.13	24.68285714	8.004285714
18	1862	7.56	23.77	24.51857143	7.925714286
19	1863	8.11	24.28	24.47714286	7.941428571
20	1864	7.98	25.03	24.58714286	7.972857143
21	1865	8.18	25.23	24.61857143	7.984285714
22	1866	8.29	24.92	24.61428571	7.99
23	1867	8.44	25.22	24.65428571	8.058571429
24	1868	8.25	25	24.77857143	8.115714286



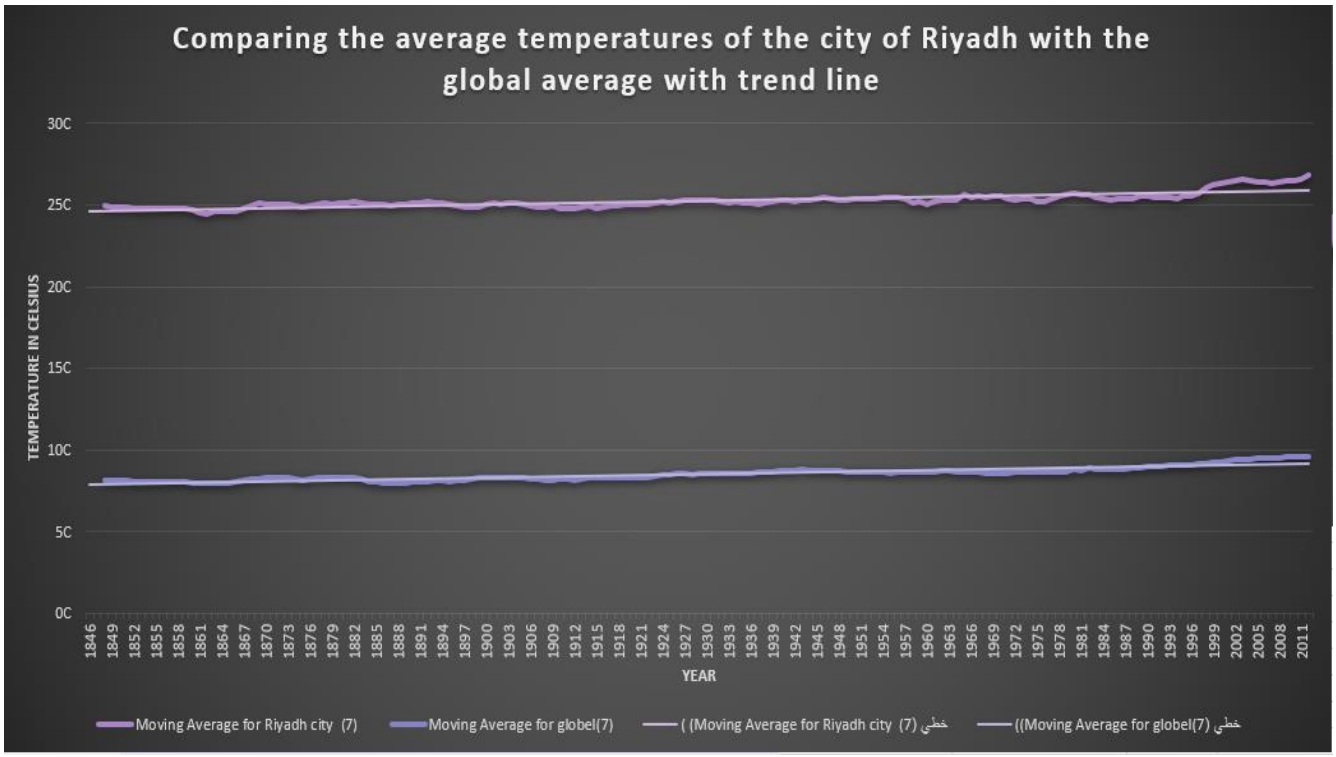
	A	B	C	D	E
1	Year	Globel	Riyadh city	Moving Average for Riyadh city (7)	Moving Average for globel(7)
2	1846	8.55	25.3		
3	1847	8.09	25.3		
4	1848	7.98	24.56		
5	1849	7.98	24.8	24.99	=AVERAGE(B2:B5)
6	1850	7.9	24.34	24.86	8.1
7	1851	8.18	25.03	24.88833333	8.113333333
8	1852	8.1	24.85	24.88285714	8.111428571
9	1853	8.04	24.93	24.83	8.038571429
10	1854	8.21	24.72	24.74714286	8.055714286
11	1855	8.11	24.92	24.79857143	8.074285714
12	1856	8	24.57	24.76571429	8.077142857
13	1857	7.76	24.26	24.75428571	8.057142857
14	1858	8.1	25.01	24.75142857	8.045714286
15	1859	8.25	24.95	24.76571429	8.067142857
16	1860	7.96	24.94	24.76714286	8.055714286
17	1861	7.85	24.13	24.68285714	8.004285714
18	1862	7.56	23.77	24.51857143	7.925714286
19	1863	8.11	24.28	24.47714286	7.941428571
20	1864	7.98	25.03	24.58714286	7.972857143
21	1865	8.18	25.23	24.61857143	7.984285714
22	1866	8.29	24.92	24.61428571	7.99
23	1867	8.44	25.22	24.65428571	8.058571429
24	1868	8.25	25	24.77857143	8.115714286

2- moving average plot

Here, the moving average was used to make it easier to monitor the long-term trends and not get lost in the daily fluctuations of the large amount of data.



Third: **trend line**



Here we can observe the average temperatures of the city of Riyadh increasing over time, and when we see the average global temperatures, it also increases over time and thus we can generalize the results that the world has an increase in the average temperatures over time.

We can also note that the difference is constant over time between the average temperatures of the city of Riyadh and the average temperatures of the world.

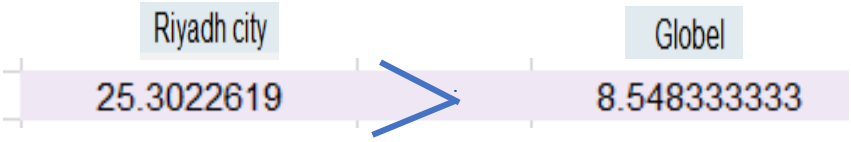
Conclusion

I will mention the most prominent similarities and differences between the average temperatures of the city of Riyadh and the global average.

Similarity and difference:

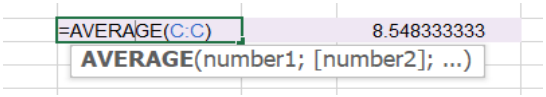
1- The average temperatures increase for both the world and the city of Riyadh over time.

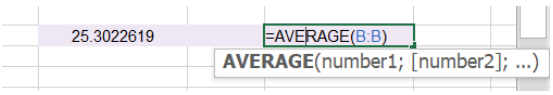
And we can see



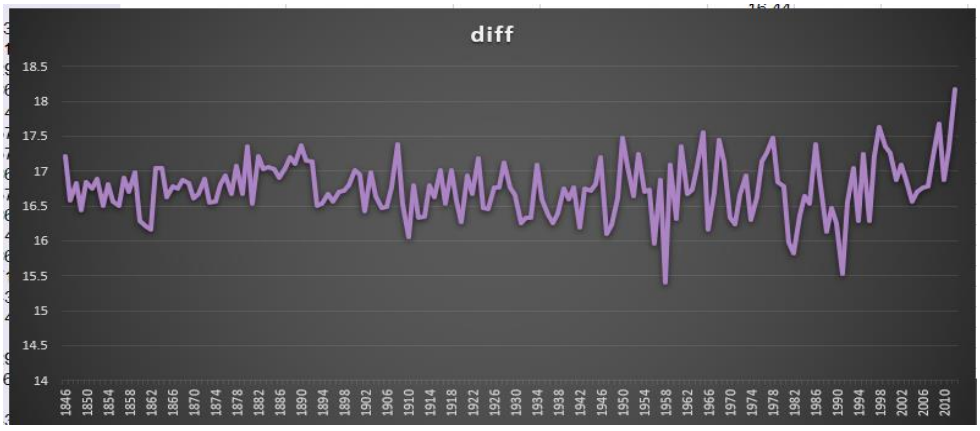
The average temperatures rise in Riyadh compared to the average temperature of the world.

according to:





2- The difference is different between the average temperatures of Riyadh and the average temperatures of the world.



We note here that the difference between the temperature of the city of Riyadh and the temperature of the world was close in the beginning, but in the end the fluctuation began to become large, so this drawing shows us that the difference is not fixed.

3- The dispersion of the data for the city of Riyadh is greater than the dispersion of the data for the global average temperature.

according to:

sd for (Global)		sd for (Riyadh city)
0.459541123	<	0.638091937

This is somewhat normal because of the large number of cities and countries in the world, which makes the data closer to each other.

4- The world includes many countries and cities other than the city of Riyadh, which is one city, and this is a factor that affects the difference in temperature.

End