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Track : Data Analysis (Udacity Nanodegree Program)

Report : Project 1 (Explore Weather Trends)

Introduction :

In this report, the global data temperatures and Cairo temperatures are compared using the concept of average moving. This concept will help to easily analyze the data and to extract some useful observations. It is better than comparing the temperatures for every year because the data is fluctuating and extracting data by this way will be very difficult. Looking at the chart of the average temperature per year versus year is useful when we want to look at the data of a year but It is not useful to estimate the overall trend. The tools used are :

- My SQL : To extract data from database
- Excel : To handle and make charts for data extracted from the data base

Step 1: Exporting data from data base :

Firstly ;we extract the global data by the following queries and The code is written in italic font :

SELECT g.year ,g.avg_temp

FROM global_data g

Then we download the output data to be viewed and handled using Microsoft Excel.

Secondly ; A query needed to pull out the cities located in Egypt to decide which city is the nearest to my location in Egypt . The code is written in italic font .

SELECT c.city , c.country

FROM city_list c

WHERE country LIKE 'Egypt'

The output shows that there is only two cities from Egypt are in database : Cairo and Alex. The nearest to me is Cairo

Finally; we pull out the data related to Cairo. The code is written in italic font.

SELECT c.city ,c.year,c.avg_temp

FROM city_data c

WHERE city LIKE 'Cairo'

Then we download the output data to be viewed and handled using Microsoft Excel.

Step 2 : Generating the Moving Average for each table using Excel :

I suggest make the moving average for each 10 years. The function AVERAGE() is used and copied for all the cells. This is done for the two tables. The chart is generated automatically by Excel after selecting the data and

choosing chart type as scatter .We can also manipulate the graph to add the title of the graph and the axes' names. I will present some figures to show the output graphs and the average function in Excel.

Figure 1 is to show the average function in Excel. Figure 2 and 3 to show the average moving temperatures for the Globe and Cairo . Figure 4 is to make a comparison between the two curves.

SUM =AVERAGE(B2:B11)

	A	B	C
1	year	avg_temp	Average Moving Temp of the globe
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	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

Fig.1 AVERAGE function in Excel

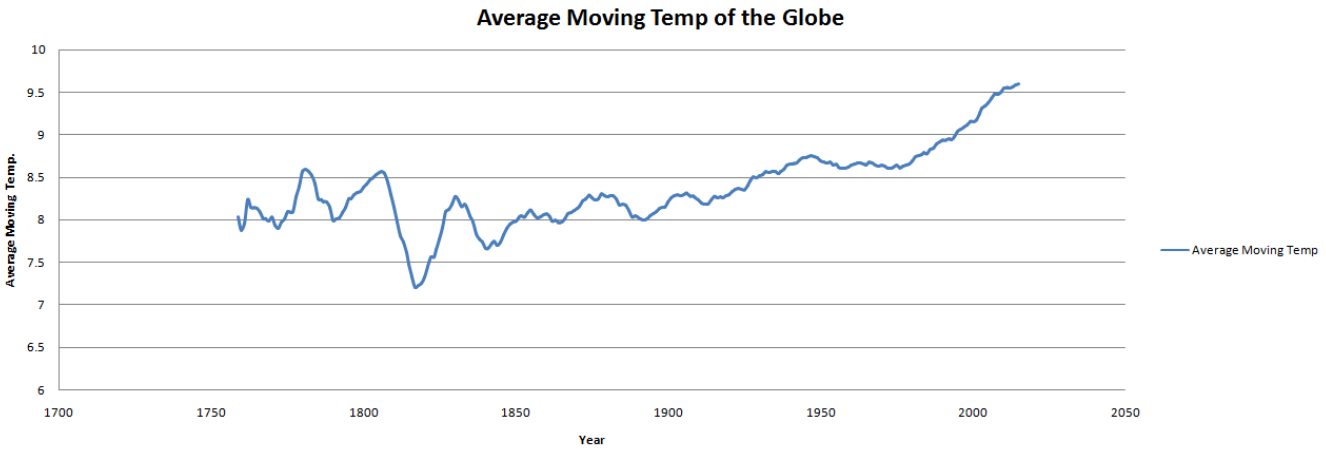

Fig.2 Average Moving temperature for the Globe

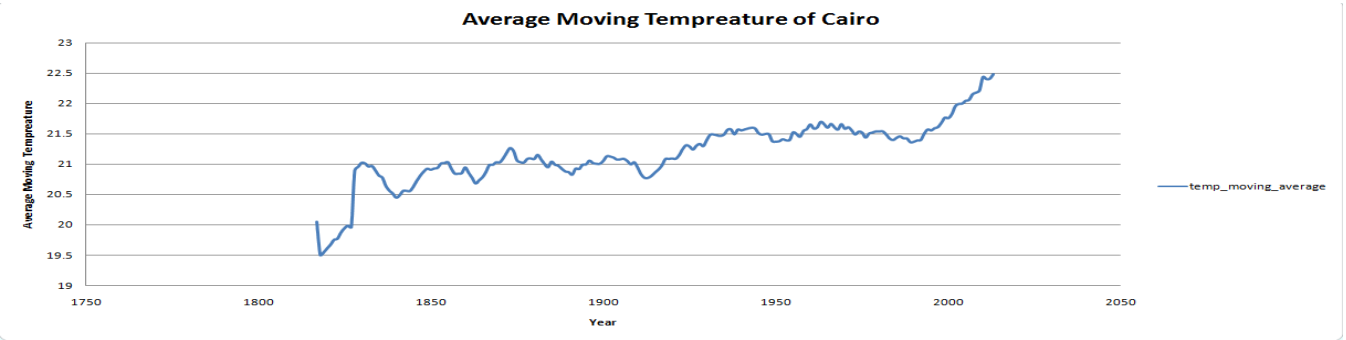

Fig.3 Average Moving Temperature for Cairo

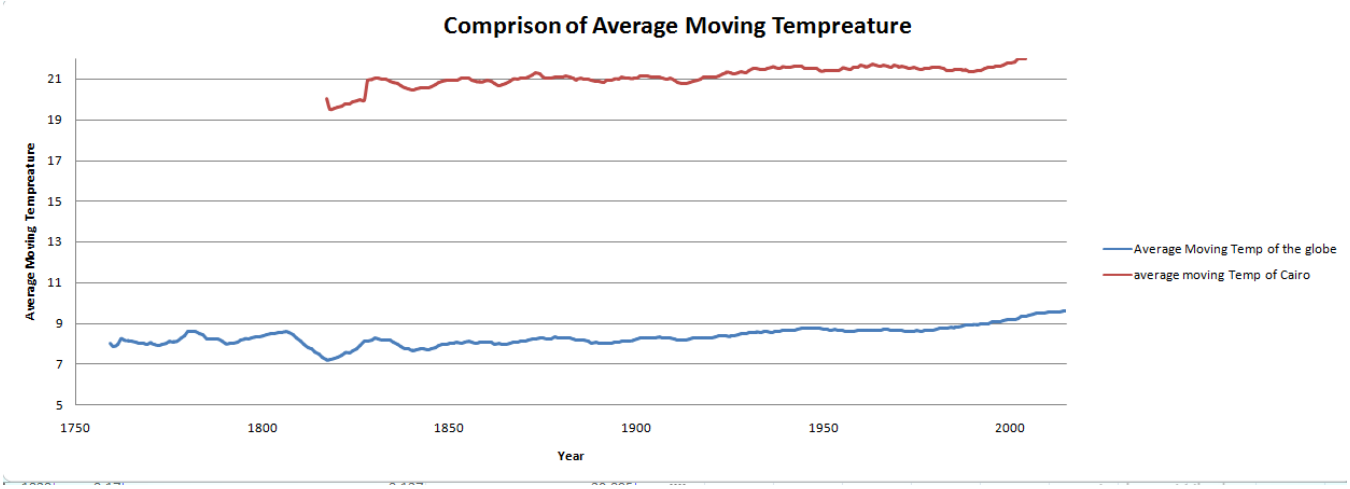

Fig.4 Comparison of Average Moving Temperature

Step 3 : Observations for the data :

- Cairo data begins from 1808 and the global data begins from 1750. Therefore, The comparison begins from 1808.
- We can notice that there is symmetry between the two curves. When it gets hotter for the globe, It gets hotter also for Cairo and vice versa.
- From Figure 4, It is very obvious that Cairo is hotter than the average temperature of the globe. It is obvious also that the difference in temperature is consistent. The two curves are going up and down nearly at the same intervals.
- From the above figures, we can notice that the changes in the two curves are the same. the two curves are going up and down at the same time and this means that Cairo average moving temperature curve moves similarly to the average moving temperature curve of the globe.
- It is obvious from fig.2 and 3 that the world and also Cairo is getting hotter by time.

- Up to 1950, the global average moving temperature was going up and down by time. After this date, The average moving temperature was going up all the time without any tendency to go down again. This applies also for Cairo. This ensures the fact of green house effect caused by CO_2 emissions.
- The average moving temperature of the globe and Cairo was increasing at an exponential rate after 1990. This was very strange and unusual compared to the rate of increase before this date.

Conclusion :

It is now obvious how utilizing the data analysis tools enabled us to make good analysis for the temperatures for the last 250 years and this helped us to understand the weather trend. Generally speaking, it is getting hotter and the rate of increase of temperature has increased since 1990.

These observations made using the concept of the average moving. Making these observations without this concept was not an easy task because of the nature of data (enormous amount ,stochastic ,small deviations).The average moving concept enables us to easily estimate the overall trend of data.