Global vs Local Weather Trends

Case Study - Bucharest

7 Day Moving Average Global and Local Temperatures Comparison
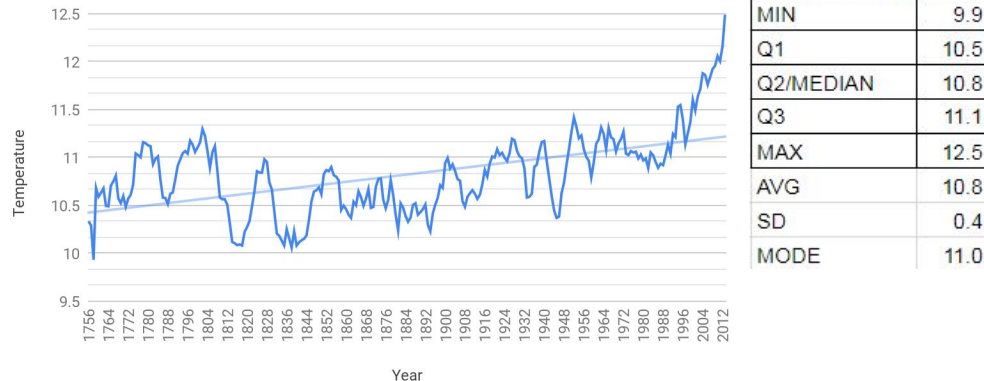
7-day Moving Average Global Temperatures

5 Number Summary	
MIN	7.2
Q1	8.1
Q2/MEDIAN	8.3
Q3	8.6
MAX	9.6
AVG	8.4
SD	0.5
MODE	8.3

7 Day Moving Average Bucharest Temperatures

5 Number Summary	
MIN	9.9
Q1	10.5
Q2/MEDIAN	10.8
Q3	11.1
MAX	12.5
AVG	10.8
SD	0.4
MODE	11.0

The two line charts shows the evolution of average temperatures from 1950 to 2015. The first one is for global temperatures while the second one is from my hometown, Bucharest. The scope of these visualizations is to compare local versus global weather trends.

We can see that both globally and locally the average temperature is increasing.

Compared to global average temperatures (8.4 degrees), Bucharest is a hotter citty with an average of 10.8 degrees.

The average global temperatures ranges from 7.2 to 9.6 degrees while Bucharest average temperatures ranges from 9.9 to 12.5 degrees. The first has a range of 2.4 and the second 2.6 degrees and they both have similar standard deviation - 0.5 global, 0.4 local - which means they both have similar spread and variability of the data points.

Bucharest vs global change in average temperature

14-day Moving Average Global Temperatures

We can see that the local trend is consistent to the global trend. To compare the two let's look at the 14-day Moving Average line chart. It is easier to see the long term trends in average temperature for Bucharest.

The most rapid increase in global average temperature started around year 1820 when the minimum average temperature was recorded. Ranging from 7.4 to 9.6 in 2015 with a change of 2.2 degrees. For Bucharest, the most rapid increase in average temperature started around year 1840, when a minimum was of around 10 was recorded to a high of 12 degrees in 2015. We can see that both globally and locally, in the last 100 years the average temperature increased by 2 degrees.

14 Day Moving Average Bucharest Temperatures

Global and Local 7 Day Moving Average Correlation

7 Day Moving Average Global and Local Temperature
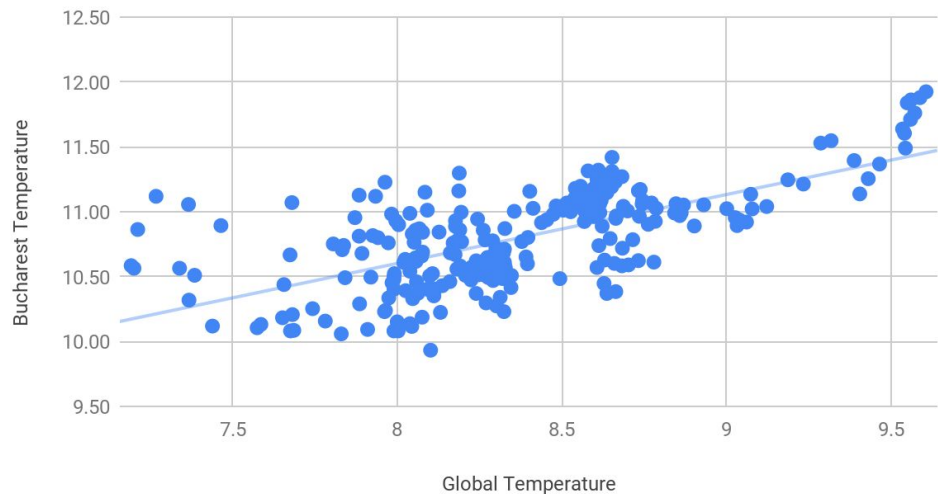
The Correlation Coefficient is 0.7 which means that there is a positive and strong linear relationship between Global and Bucharest average temperature change from 1950 to 2015.

Steps outline

1. Extract the data from the database with SQL and export the result as a .csv file:
   - I used two queries:
     - One to extract global average temperatures and exported it to a .csv file;
     - The second one to extract Bucharest's average temperatures and exported it to another .csv file;
2. I opened the two .csv files in a Google Sheet document:
   - I calculated the 7-Day and 14-Day Moving Average;
   - I inserted the line charts;
   - I calculated the 5 number summary, the Mean, Standard Deviation and the Mode.
3. Moving Average calculation:
   - For 7-Day Moving Average: I inserted a column to the right of average temperatures, moved down 7 years (rows) and calculated the average temperatures for the first seven years with the AVERAGE() function. I copied the cell, moved at the bottom of the table, pressed SHIFT, selected the last cell of the column, and press CTRL+V (paste).
4. Correlation Coefficient calculation:
   - I used the CORREL() function to calculate the Correlation Coefficient between global and Bucharest temperatures;
   - The linear relationship is strong if the Correlation Coefficient is greater or equal to 0.7.

Steps outline

5. Key considerations:
    - I have also inserted a histogram for the two distribution in order to see the shape
    - When looking at the Bucharest histogram I saw that there are some outliers. Looking at the data I observed that from 1743 to 1749 the data points were not consistent. In order to achieve more accurate results I decided not to use the 1743-1749 data when I calculated the Moving Average and use only the years starting 1750. The Global Average temperature data was ranging from 1950 to 2015.

SQL Queries

1. Query to extract the global average temperatures:

SELECT *
      FROM global_data;

2. Query to extract the Bucharest average temperatures:

SELECT *
      FROM city_data
      WHERE city='Bucharest';