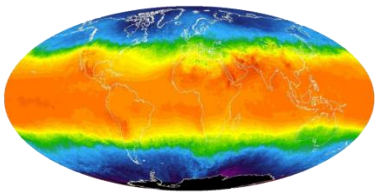

Udacity - Data Analytics NANODEGREE
Project (1): Exploring Weather Trends
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- ## Introduction:

In this project, I will analyze local and global temperature data and compare the temperature trends where I live to overall global temperature trends.

The closest big city in the available database is “Damascus”.

- ## Retrieving Data from Database:

- To see the available nearby city whose temperature data is available:

```
SELECT *
FROM city_list
WHERE country = 'Syria';
```

- To explore the local city_data:

```
SELECT *
FROM city_data
WHERE city = 'Damascus' AND country = 'Syria';
```

- To explore the global_data:

```
SELECT *
FROM global_data;
```

- To retrieve the final data from database from multiple tables:

```
ALTER TABLE city_data RENAME COLUMN avg_temp to local_avg_temp;
ALTER TABLE global_data RENAME COLUMN avg_temp to global_avg_temp;
SELECT global_data.year,city_data.city,global_data.global_avg_temp,city_data.local_avg_temp
FROM global_data,city_data
WHERE(global_data.year = city_data.year) AND
(city_data.city = 'Damascus' AND city_data.country ='Syria');
```

****Note: The first line and second line of the last SQL code is used to rename the column 'avg_temp' in both tables 'city_data and global_data'

- Download the *.csv file and open it in Microsoft Excel 2010.
- Calculate Moving Average's for 10 years for global_avg_temp and local_avg_temp to smooth out data and make it easier to observe long term trends after plotting the line chart (Ex. =AVERAGE(D2:D11))
- Plot line charts for Global temperatures versus Local temperatures with respect to year.

- Results:

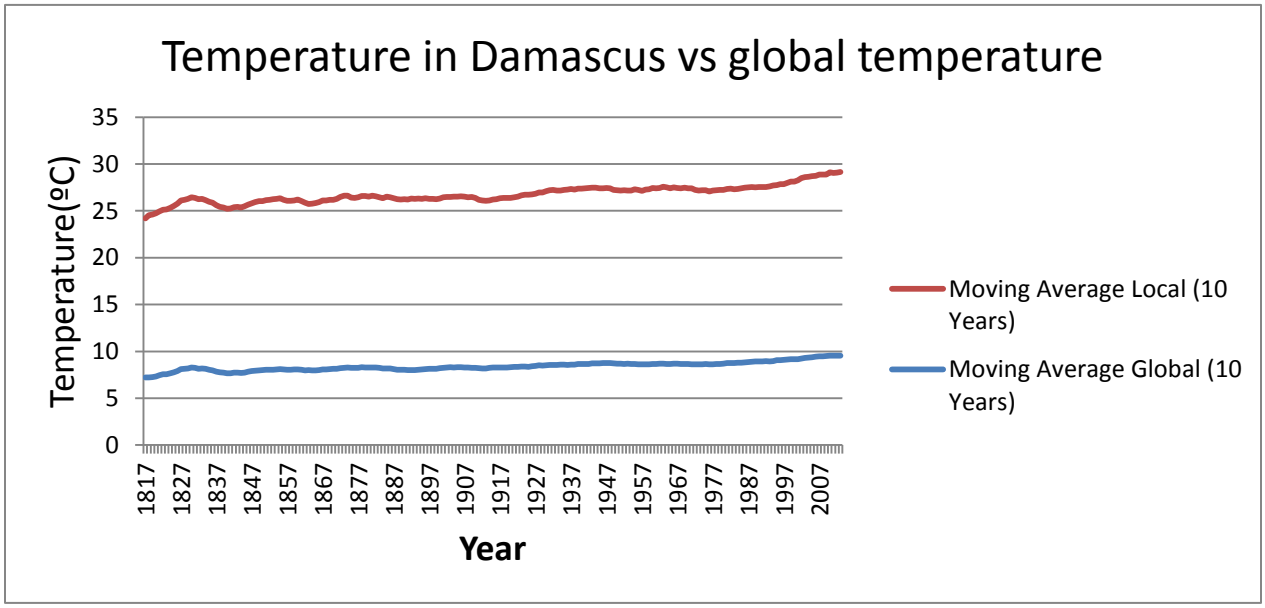

Figure 1: Temperature in Damascus vs global temperature

- # Observations:

  - Global average temperature is varies between 7.203 to 9.556 Degree Celsius but in Damascus city average temperature is varies between 17.007 to 19.585 Degree Celsius.
  - Damascus city is hotter than global average temperature according to comparing the Global average temperature and Damascus average temperature.
  - Changing in temperature over time:

Period	Changing in Global average temperature	Changing in Damascus average temperature	Increasing/Decreasing
1818 – 1830	7.223 – 8.274	17.315 – 18.161	**Increasing**
1831 – 1844	8.229 – 7.694	18.15 – 17.674	**Decreasing**
1845 – 1878	7.74 – 8.303	17.917 – 18.271	**Increasing**
1879 – 1892	8.277 – 8.000	18.311 – 18.308	**Decreasing**
1893 – 2013	8.008 – 9.556	18.284 – 19.583	**Increasing**

  - Damascus and Global average temperature have a similar kind of trends. Both trends seem to have ups and downs.
  - The difference between Global average temperature and Damascus average temperature is consistent over time.
  - According to the graph the global average temperature from 1817 to 2013 increased by 2.353 °C, so world is getting hotter.

- # Correlation Coefficient:

  Correlation coefficient formula is used to find how strong a relationship is between data. The formula returns a value between -1 and 1:

$$r = \frac{n\sum(xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Correlation coefficient between global and Damascus temperature trends:

$$r = \frac{206 \times 31805.6688 - 1729.75 \times 3780.28}{\sqrt{[206 \times 14589.3329 - 2992035.063][206 \times 69474.4912 - 14290516.88]}} = 0.773409449$$

The correlation coefficient between global and Damascus temperature trends is 0.773 which indicates strong positive relationship among them.

- Final Conclusion:

The temperature of globe has been rising exponentially and local area temperatures are also increasing at the same rate.

The World is Getting Hotter