

Report for explore weather trends

Step 1 – SQL query to retrieve the data

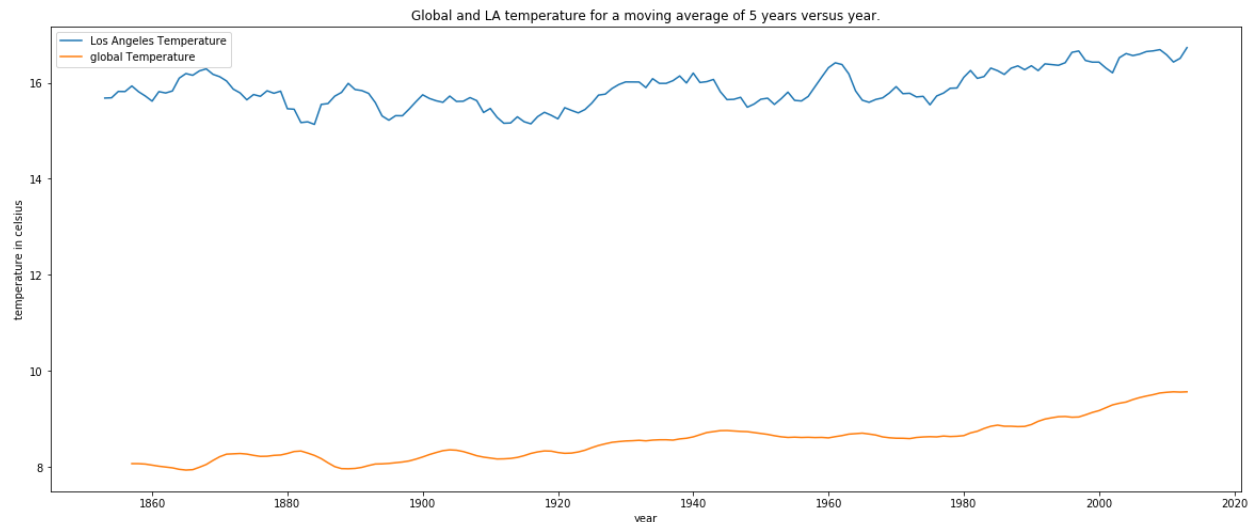
Use the following queries to retrieve the average yearly temperature for “Los Angeles” and the global average. Then download the data into csv file, name “LA.csv” and “global.csv”.

```
1. SELECT local.year, local.avg_temp as LA, global.avg_temp as globe
2. FROM city_data AS local
3. inner JOIN global_data AS global
4. ON local.year = global.year
5. WHERE local.city = 'Los Angeles' and local.country = 'United States';
```

Step 2: Calculate moving average and visualize the Data

I use following code to extract, calculate moving average and plot the figure.

```
1. import pandas as pd
2. import numpy as np
3. import matplotlib.pyplot as plt
4. import seaborn as sns
5. %matplotlib inline
6.
7. data = pd.read_csv('results.csv', names = ['year', 'LA', 'global'], skiprows=1)
8. data['LA_ma5_temp'] = data['LA'].rolling(window=5).mean()
9. data['global_ma5_temp'] = data['global'].rolling(window=5).mean()
10.
11. plt.figure(figsize=(20, 8))
12. plt.plot(data['year'], data['LA_ma5_temp'], label='Los Angeles Temperature')
13. plt.plot(data['year'], data['global_ma5_temp'].rolling(window=5).mean(), label='global
    Temperature')
14. plt.xlabel('year')
15. plt.ylabel('temperature in celsius')
16. plt.title('Global and LA temperature for a moving average of 5 years versus year.')
17. plt.legend()
18. plt.show();
```



- Plot 1 - Plot the data for Los Angeles 5 years moving average temperature versus global 5 years moving average temperature, with year on the x-axis and temperature on the y-axis.

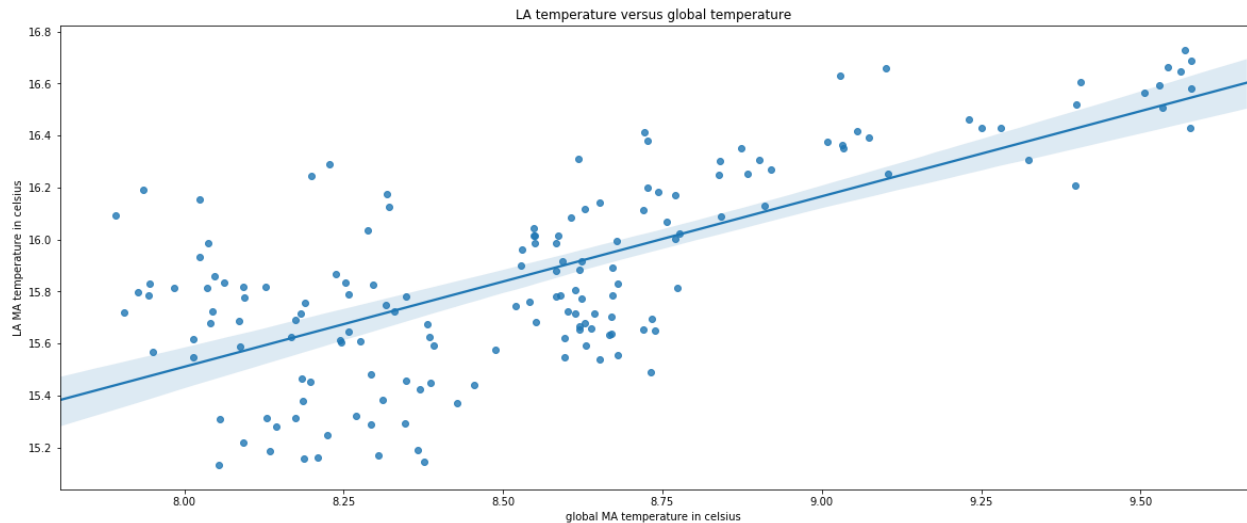
Step 3: Observations from visualization

Answer the following questions:

- Is your city hotter or cooler on average compared to the global average? Has the difference been consistent over time?
The city I lived in is hotter on average compared to the global average by roughly 8 degree. The difference is quite consistent over 150 years from 1850 to 2015, since Los Angeles is located in the warmer area on earth.
- How do the changes in your city's temperatures over time compare to the changes in the global average?
Los Angeles's 5 years moving average temperature has lots of fluctuations compared to global average temperature. The moving average temperature of LA fluctuation within 1 degree, with a trend of increasing in recent years. Global average temperature has less fluctuation, but the trend is that after 1980, there is a dramatic increase by 1 degree.
- 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?
Los Angeles's 5 years moving average temperature seems to increase in recent 60 years, even though there are some small fluctuations, which is similar to global 5 years moving average temperature. We can see clearly a trend that after 1980, the global temperature is getting warmer by 1 degree. Same for LA's temperature, since 1980 LA's temperature is also getting warmer by around 1 degree, while there are some small fluctuations, but the trend is clearly. From 1850 to 1950 the global temperature increasing is not so dramatically, but recent

years the global temperature increasing is much faster, probably due to industrialize globally since 1980.

- Can you estimate the average temperature in your city based on the average global temperature? What is the correlation coefficient?



I plot the global MA temperature and LA MA temperature with seaborn library. There seems to be a linear relationship between them. The data are less scattered, when global temperature is higher. But it is also possible due to the fact that there is less data points when global temperature is higher. I use `np.polyfit` to fit the data. The fitting curve is that:

$$\text{LA Temperature} = 0.656 * \text{Global Temperature} + 10.26 \text{ degree}$$

I also use `stats.pearsonr` to measure the Pearson correlation coefficient, which $R = 0.709$, which states that there is a strong positive correlation between global MA temperature and LA MA temperature.