UDACITY PROJECT 1: EXPLORING WEATHER TREND
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Executive Summary:

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

Steps Outline:

1. Extracting Data

I used SQL query to extract city_data, global_data and city_list from the temperature database and downloaded file results in csv format.

The commands I used to extract the data are listed below;

```
SELECT *
FROM city_data
WHERE city = 'Perth' AND country = 'Australia'
```

```
SELECT *
FROM city_list
```

```
SELECT *
FROM global_data
```

2. Preparing Data for Analysis

2.1 Removing missing data

In this step, I find Perth in the city_list to ensure the data is available for analysis. I identified missing data in the csv file and eliminated the missing gap from both global_data and perth_data to enable equal comparison. In this case, both data starts from 1875 to 2013.

2.2 Calculating Simple Moving Averages

In this step, I decided on 10 year simple moving averages for both data as I feel it provides better results in smoothing the fluctuations whilst not completely linearizing the trend.

To do this, I used below formula in excel from YR 1885 and dragged the formula to the end of YR 2013;

=AVERAGES()

3. Plotting the graph

I plotted my line graph using Python in Jupyter Notebook and imported Panda and Matplotlib libraries. My key considerations in using line graphs to visualize data over other methods is because I wanted to show the temperature changes for both data over time.

Below are my command lines in importing both libraries:

```
In [3]: import pandas as pd

In [4]: from matplotlib import pyplot as plt
```

To read the csv file, I typed below command to extract saved file in my Desktop:

```
In [7]: city_data = pd.read_csv('city_data.csv')

In [8]: city_data
```

Snippets of my city_data results:

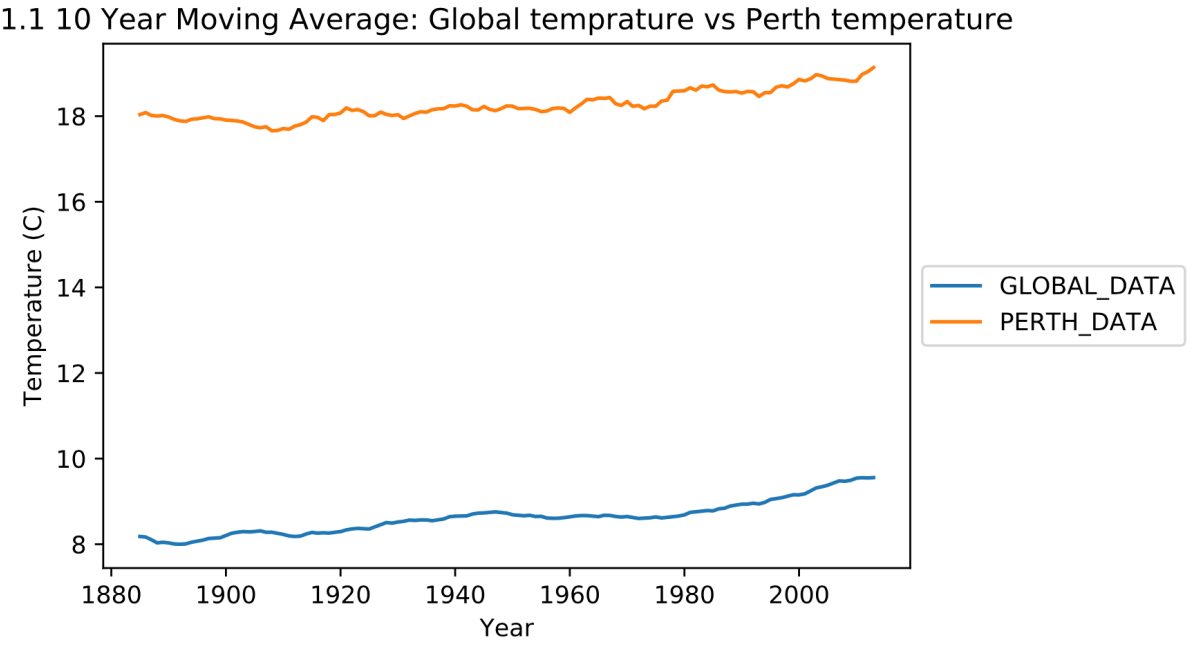
Out[8]:

	YR	GLOBAL_DATA	PERTH_DATA
0	1885	8.181	18.036
1	1886	8.168	18.083
2	1887	8.105	18.017
3	1888	8.031	18.004
4	1889	8.046	18.015
5	1890	8.031	17.981
6	1891	8.006	17.923
7	1892	8.000	17.890
8	1893	8.008	17.877
9	1894	8.047	17.927
10	1895	8.070	17.939
11	1896	8.096	17.961
12	1897	8.134	17.985

I used below commands to plot the graph and label both the x-axis and y-axis and input legend outside of the graph. I then saved the graph in pdf format.

```
In [32]: plt.plot(city_data.YR,city_data.GLOBAL_DATA)
         plt.plot(city_data.YR,city_data.PERTH_DATA)
         plt.title('1.1 10 Year Moving Average: Global temprature vs Perth temperatu
         plt.xlabel('Year')
         plt.ylabel('Temperature (C)')
         plt.legend(['Global temperature','Perth temperature'])
         plt.legend(loc='center left', bbox_to_anchor=(1, 0.5))
         plt.savefig('10_YR_MA.pdf', transparent=True, bbox_inches='tight')
         plt.show()
```

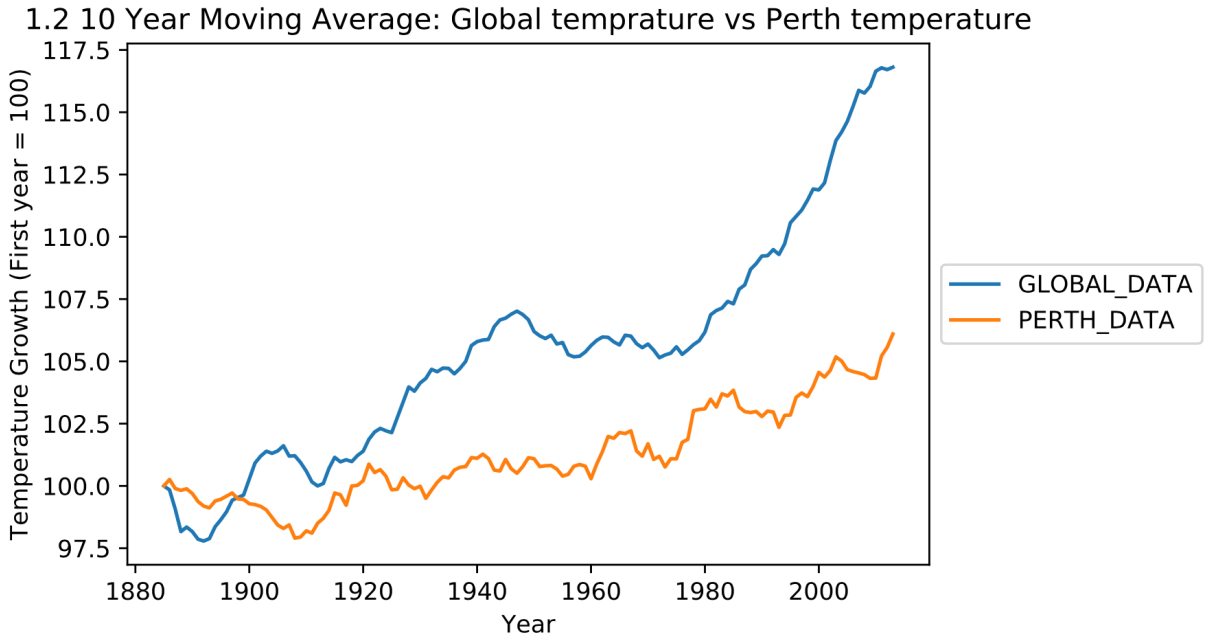
Graph below shows 10 year simple moving averages for global temperature versus Perth temperature over time:



To show the relative growth in temperature for both city over time, I used below command to produce relative growth line graph:

```
In [31]: plt.plot(city_data.YR,city_data.GLOBAL_DATA / city_data.GLOBAL_DATA.iloc[0]
         plt.plot(city_data.YR,city_data.PERTH_DATA / city_data.PERTH_DATA.iloc[0] *
         plt.title('1.2 10 Year Moving Average: Global temprature vs Perth temperatu
         plt.xlabel('Year')
         plt.ylabel('Temperature Growth (First year = 100)')
         plt.legend(['Global temperature','Perth temperature'])
         plt.legend(loc='center left', bbox_to_anchor=(1, 0.5))
         plt.savefig('10_YR_RELATIVE_GROWTH_MA.pdf', transparent=True, bbox_inches='
         plt.show()
```

Graph output:



4. Observations

From graph 1.1 illustrated above, Perth temperature is hotter on average compared to the global average. The average temperature for Perth is between 18-20 degrees celcius. From graph 1.2, global temperature and Perth temperature have increased over time. In addition, global temperature appears to grow exponentially since 1980 while Perth temperature appear to show a steady increase over time.