

Exploring Weather Trends:

Name: Meshari Althubaiti

Project #1

The goal of this project is to analyse the different temperatures over a 173-year period. There are two main temperature categories that have been examined, which are global and local temperatures. The two average temperatures have been analysed and presented on a historical line graph to get a better understanding and clearer insight into the weather trends. This project consists of three main stages as follows:

- **Stage one (Collecting data):**

At this stage, temperature data was needed to analyse the weather trends. This information was obtained from the Udacity service's database using SQL (Structured Query Language).

The following SQL query was used to extract the city list to determine the nearest city to the analyst:

```
SELECT * FROM city_list
```

- 1- Then, the data (including year, city, country, avg_temp) of the chosen city from the previous step was obtained using:

```
SELECT * FROM city_data
```

```
WHERE CITY = 'Melbourne'
```

- 2- The global temperature data (year and avg_temp) was accessed using the following query:

```
SELECT * FROM global_data
```

Finally, all the data that has been extracted from the database was saved in a CSV file in order to analyse it using MS Excel.

- **Stage two (Clean, organize, and analyze data):**

- At this stage, the data from the previous step was cleaned, organized, and analysed as follows:

1- First, the starting year of the temperature measurement starts in the year 1841 in Melbourne, whereas the starting year of the measurement for the global temperature starts in 1905. So, the years of both Melbourne and global were matched to start both in the year 1841 and end in 2013.

2- Second, data was ordered using MS Excel as follows:

| Year | Ave_temp (Globele) | 5 Years Moving avarage Tempreture (Global) | Avg_temp (Mellbourne) | 5 Years Moving avarage Tempreture (Melbourne) |
|------|--------------------|--|-----------------------|---|
| 1841 | 7.69 | | 13.09 | |
| 1842 | 8.02 | | 12.96 | |
| 1843 | 8.17 | | 13.34 | |
| 1844 | 7.65 | | 12.6 | |
| 1845 | 7.85 | 7.876 | 13.16 | 13.03 |
| 1846 | 8.55 | 8.048 | 13.43 | 13.098 |
| 1847 | 8.09 | 8.062 | 13.03 | 13.112 |
| 1848 | 7.98 | 8.024 | 12.58 | 12.96 |
| 1849 | 7.98 | 8.09 | 12.3 | 12.9 |
| 1850 | 7.9 | 8.1 | 12.99 | 12.866 |
| 1851 | 8.18 | 8.026 | 12.97 | 12.774 |
| 1852 | 8.1 | 8.028 | 12.72 | 12.712 |
| 1853 | 8.04 | 8.04 | 12.51 | 12.698 |
| 1854 | 8.21 | 8.086 | 12.84 | 12.806 |
| 1855 | 8.11 | 8.128 | 11.43 | 12.494 |
| 1856 | 8 | 8.092 | 13.4 | 12.58 |
| 1857 | 7.76 | 8.024 | 13.44 | 12.724 |
| 1858 | 8.1 | 8.036 | 13.6 | 12.942 |
| 1859 | 8.25 | 8.044 | 13.17 | 13.008 |
| 1860 | 7.96 | 8.014 | 13.29 | 13.38 |
| 1861 | 7.85 | 7.984 | 13.18 | 13.336 |
| 1862 | 7.56 | 7.944 | 13.5 | 13.348 |
| 1863 | 8.11 | 7.946 | 12.96 | 13.22 |
| 1864 | 7.98 | 7.892 | 13.01 | 13.188 |
| 1865 | 8.18 | 7.936 | 12.78 | 13.086 |

Figure 1 table of data shows the temperatures of both global and Melbourne city over the years. In addition, this table illustrates the moving averages over the years.

3- The moving averages have a period of five years starting from 1841 to 1845. This was calculated based on the first five years using the following formula:

$$= \text{AVERAGE}(B2: B6)$$

• **Stage Three (Visualizing the data):**

At this stage, the data was finally presented on a line chart that shows the weather trends and comparisons (differences and similarities). There are a few key considerations that were considered. For example, the x-axis represents the years because this makes the reading and following the trend much easier and more logical in terms of increasing and decreasing temperatures. On the other hand, the y-axis represents the temperatures of both global and Melbourne. That is, we can decide which time periods global and Melbourne

temperatures will be similar or different. Thus, it can be concluded that it is effective labelling because it discloses all the information that can be important to the analyst and the audience.

Moreover, trending lines were added to the chart to make predictions based upon the previous temperatures' readings. Finally, in order to avoid any confusion, the colours of both global and Melbourne have been given different colors. The following chart presents all the features and key points of the weather trends:

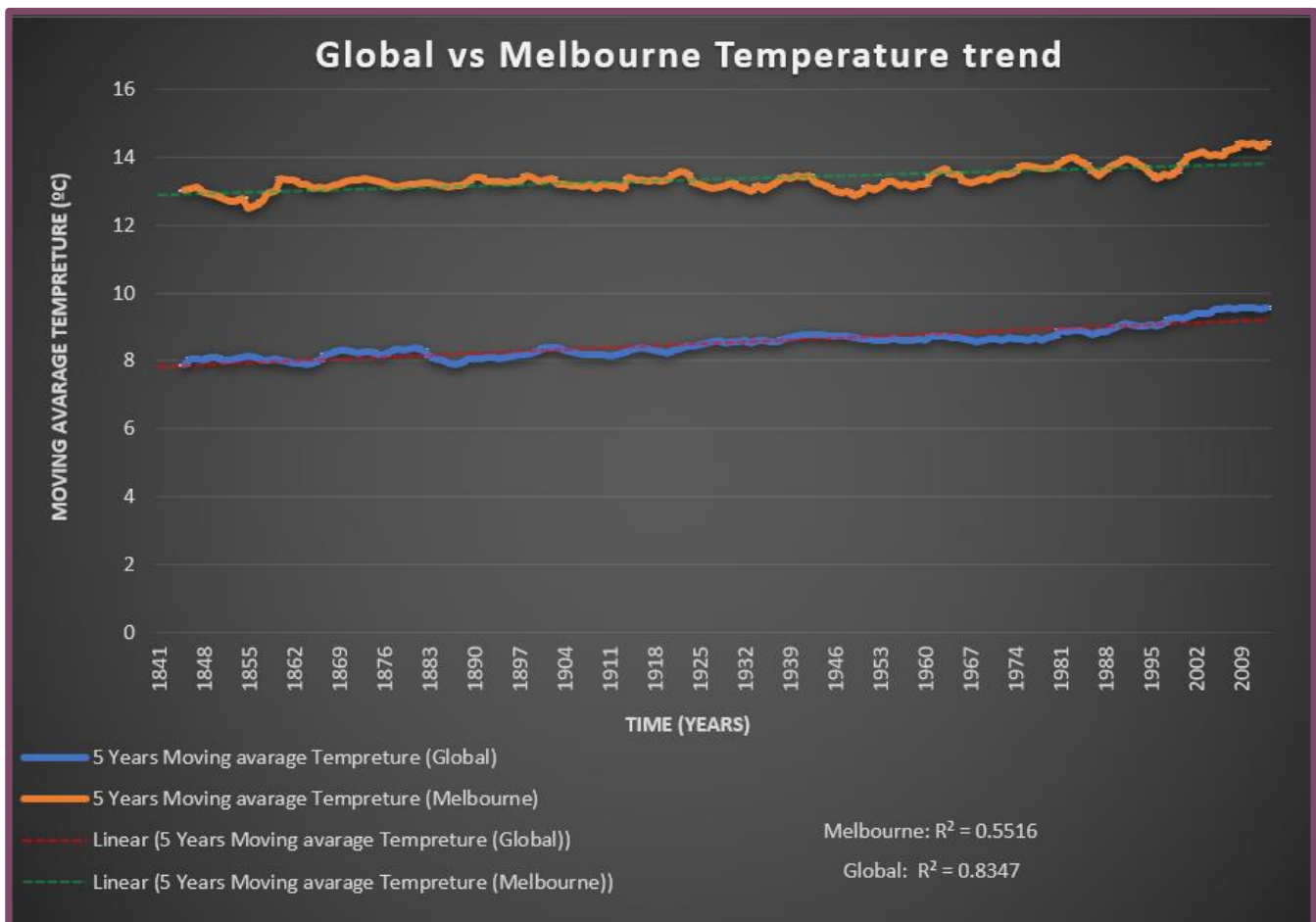


Figure 2 This line chart shows the global vs. Melbourne temperature trend. The blue line is the global temperature starting from the year 1841 to 2013. The orange line represents Melbourne's temperature starting from the same year, 1841.

- **Conclusion:**

In conclusion, it can be observed that there are some similarities and differences that form the weather trends.

- Around the years 1884 -1848 Melbourne's temperature had fluctuated and was not stable towards the decreasing point of temperature. The temperature ranged from about 13 to 15 °C. In contrast, around the same time, the global temperature has been observed to be steady at approximately 7 to 9 °C.
- Generally, as it can be inferred from the chart line, Melbourne's temperature had more fluctuations than global temperatures over the past years.
- Regardless of the relatively high Melbourne temperature fluctuations, both temperature average measurements have been observed to be increasing from around 1995 to 2013.
- Although both temperatures increased over the past years, as mentioned, Melbourne's temperature had a strongly sharp increase and decrease, resulting in unstable weather.

- Final thoughts:

Q: Can you estimate the average temperature in your city based on the average global temperature?

Based on the global temperature records, Melbourne's temperature is expected to increase due to the current issue of global warming, as it can be clearly seen on the line chart towards years 2009 and later.

Q: What's the correlation coefficient?

For Melbourne's temperature: $R^2 = 0.5516$

For Global temperature: $R^2 = 0.8347$