

Udacity – Exploring the weather trend

Exploring the weather trend between Sydney and global

1. Objective:

This project is to provide weather trend analysis between Sydney and the world using their annual average temperature from 1841 to 2013

2. Methodology

First, the following SQL code was used to extract the relevant data from Udacity, which returned 173 results

```
1 SELECT city_data.year,city_data.avg_temp AS  
   Sydney_Temp,global_data.avg_temp AS Global_Temp FROM  
   city_data  
2 INNER JOIN global_data ON city_data.year =  
   global_data.year  
3 WHERE city = 'Sydney';
```

Output 173 results

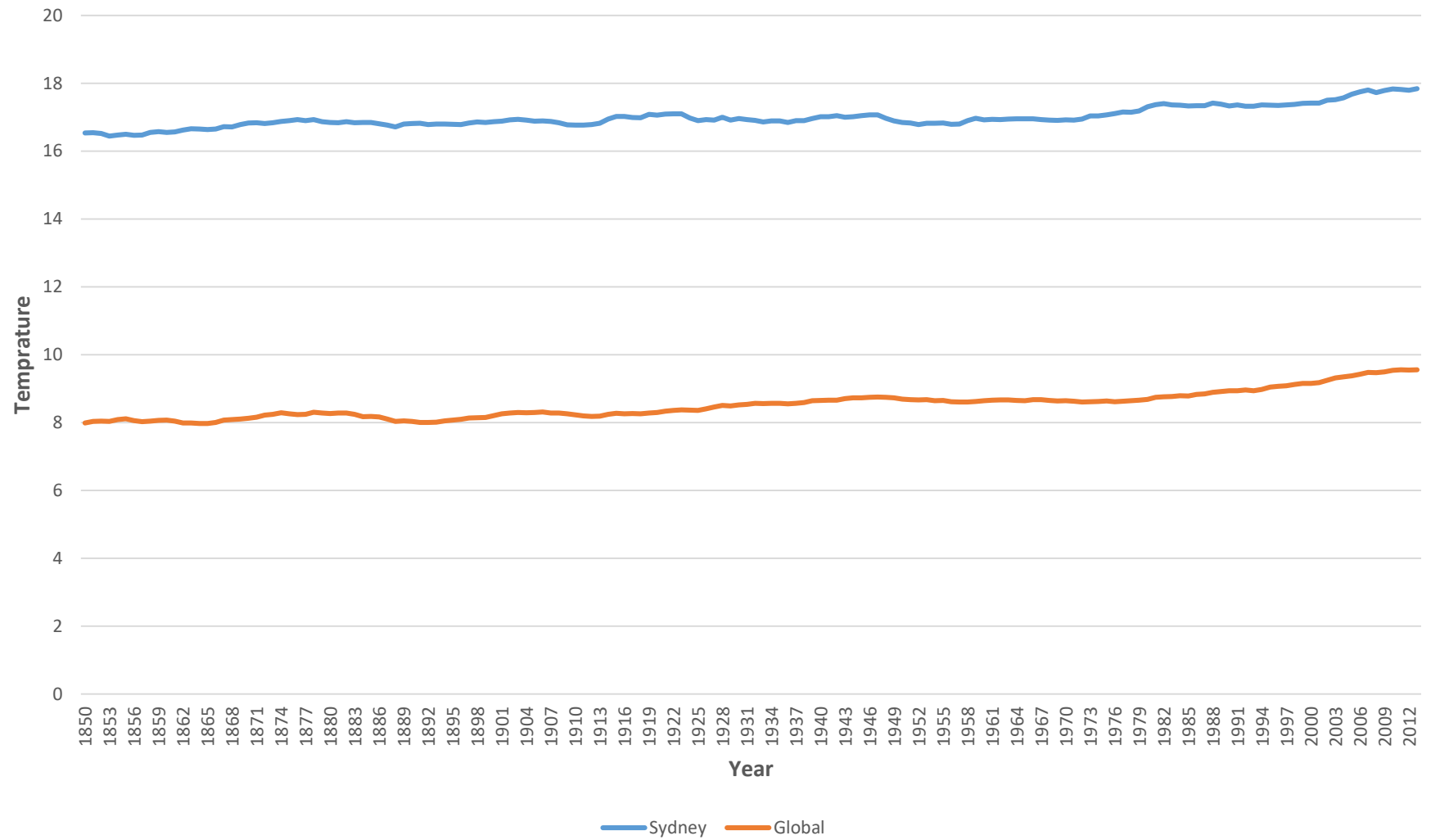
year	sydney_temp	global_temp
1841	16.56	7.69
1842	16.57	8.02
1843	16.88	8.17
1844	16.22	7.65
1845	16.64	7.85
1846	17.07	8.55

This set of data was then downloaded as the CSV file and opened with Excel. To smooth out the fluctuation between the years, a ten-year moving average calculation method was chosen. This was done by starting at the 10th row to get the first average in both 10y MA columns (Sydney & Global), and then the formula was copied down to the bottom row as shown below:

	Sydney	Global	Sydney	Global	
year	avg_temp	avg_temp	10y MA	10y MA	
1841	16.56	7.69			
1842	16.57	8.02			
1843	16.88	8.17			
1844	16.22	7.65			
1845	16.64	7.85			
1846	17.07	8.55			
1847	16.6	8.09			
1848	16.25	7.98			
1849	16.08	7.98			
1850	16.51	7.9	=AVERAGE(B3:B12)		
1851	16.6	8.18	AVERAGE(number1, [number2], ...)		
1852	16.39	8.1	16.524	8.045	
1853	16.1	8.04	16.446	8.032	
1854	16.48	8.21	16.472	8.088	
1855	16.9	8.11	16.498	8.114	
1856	16.76	8	16.467	8.059	

Since this is a simple data set with only two variables (i.e: Sydney and Global average temperature), a line chart was chosen for data visualization for its simplicity.

10yrs Moving Average - Sydney vs Global



Key considerations for choosing the line-chart:

- It should be something that I am most familiar with.
- It should be suitable for trend analysis over a period of time

Line chart is something that I have been too familiar with ever since high school. A bar chart would be another familiar one but it is not suitable given the large number of years. Moreover, for trend analysis, there is nothing better than a simple line chart.

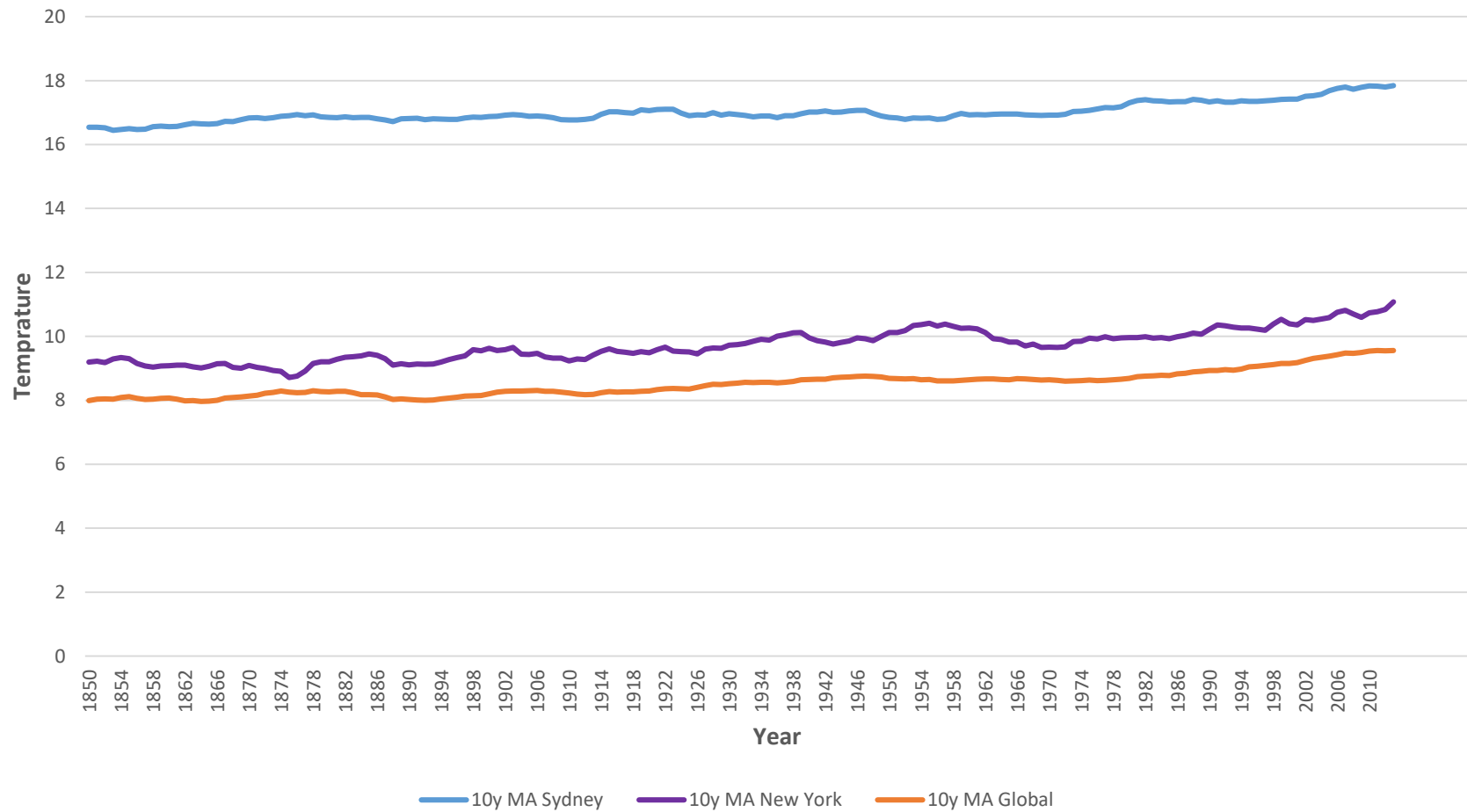
3. Findings

Overall, Sydney temperature is consistently higher than the global temperature and the temperature difference between them appears to remain unchanged across the period. Both Sydney and global temperature have an upward trend in the change of temperature. Specifically, temperature has risen approximately 1.5 degree Celsius, from 16.5 to 18 in Sydney, and from 8 to 9.5 in global temperature.

Both have almost the same upward movement from year 1970 onwards although their movements were slightly different initially. In particular, global temperature appears to remain relatively constant from 1850 to 1913 until it had a steady increase from there onwards. On the other hand, Sydney's figures had a slight increase from 1850 to 1880 but it stayed almost unchanged for almost a century until 1970 where it began to rise up again. This might suggest that global temperature is starting to affect Sydney in recent decades.

Nevertheless, it should be noted that the differences discussed above is quite minimal and both lines look very similar to each other at first glance. To find out whether other city have the same trend, New York data has been added as shown below:

10yrs Moving Average - Sydney vs New York vs Global



With New York added in, it can be seen that while it has more noticeable fluctuations compared to the other two, it also has similar upward trend like the global line especially from 1970. This leads to the question whether global temperature actually affects city temperature. In order to answer this query, Excel function **CORREL** was used to calculate the correlation coefficient between the two variables as shown below. Both cities have a correlation of 0.9 against global data, indicating a strong positive relationship between global and city temperature.

Sydney vs Global	0.900258
New York vs Global	0.921907

In conclusion, our findings suggest that the earth is getting hotter over the period of nearly two centuries and the rise in global average temperature will also lead to the rise of city's temperature, which is Sydney city in this study.