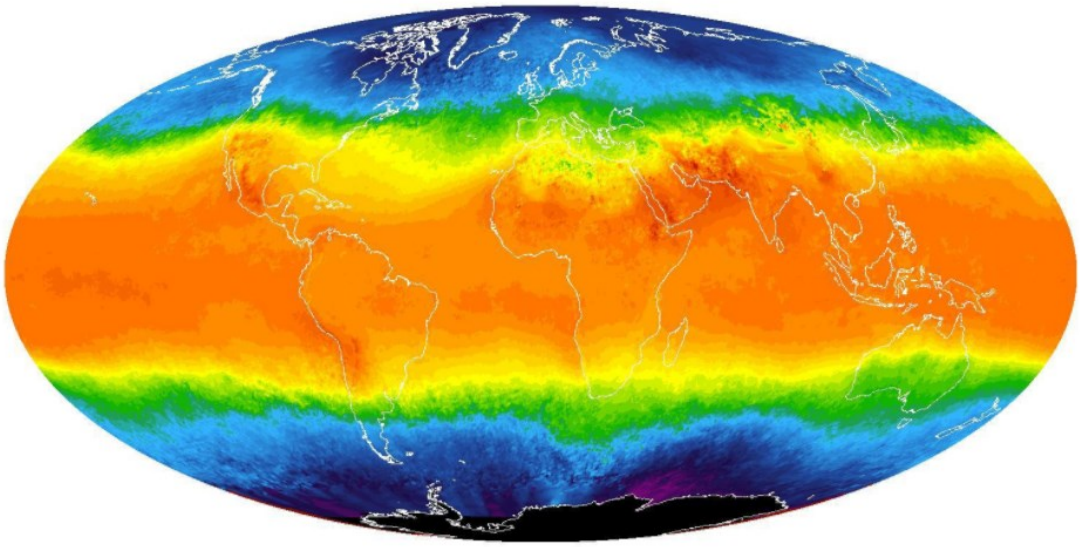
Exploring Weather Trends

Project One



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Introduction

Climate and weather are important factors in tourists' decision-making and also influence the successful operation of tourism businesses. Climate is the average (or 'normal') pattern of weather for a particular place over several decades. Changes in climate are hard to detect without very long-term records.

Climate affects all components of crop production (area, intensity, and yield) and the variability of rainfall and cyclonic patterns that are being observed globally.

In our study, we are studying Cairo weather trends against the global weather trends.

Data Extraction

The **data available** to use in the study is represented by the following two tables.

avg_temp	country	city	year
25.58	Cí´te D'Ivoire	Abidjan	1849
25.52	Cí´te D'Ivoire	Abidjan	1850
25.67	Cí´te D'Ivoire	Abidjan	1851

avg_temp	year
8.72	1750
7.98	1751
5.78	1752

As a **first step**, we needed to extract the data needed for the study from the available data using the following two SQL command to get the **required data** then represent them as a table from three columns cairo_temp, global_temp, and year.

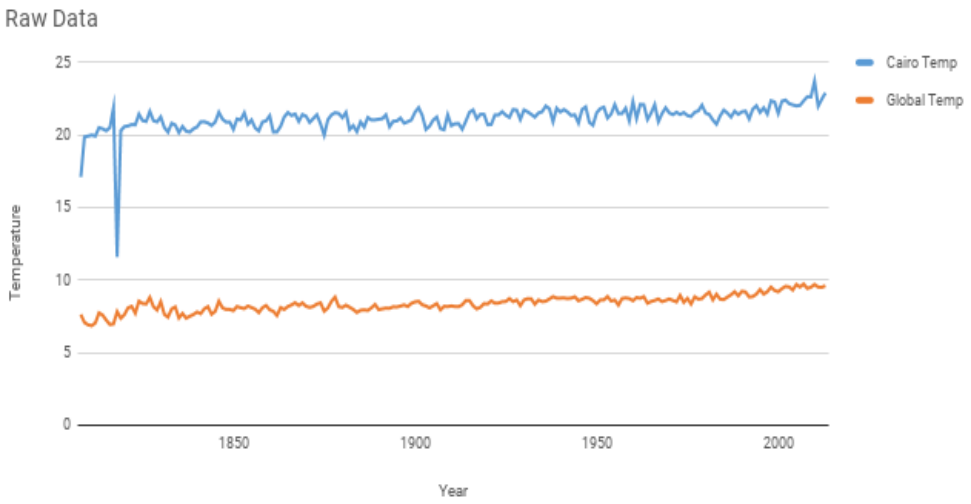
```sql
SELECT  avg_temp AS cairo_temp, year
FROM city_data
WHERE city = 'Cairo';

SELECT avg_temp AS global_temp, year
FROM global_data
WHERE year BETWEEN 1808 AND 2013;
```

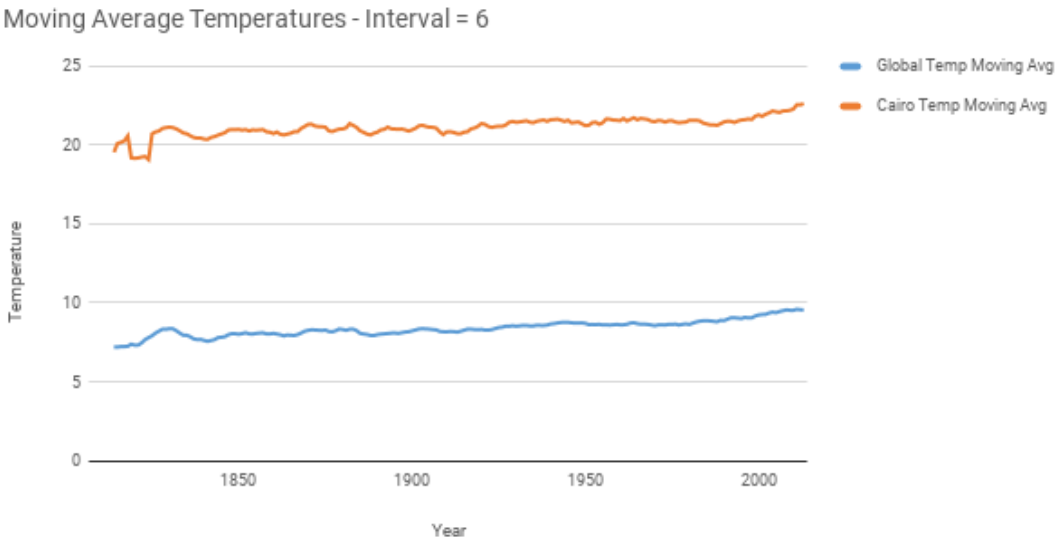
year	global_temp	cairo_temp
1808	7.63	17.11
1809	7.08	19.87
1810	6.92	19.93
1811	6.86	20
1812	7.05	19.93

Data Visualization

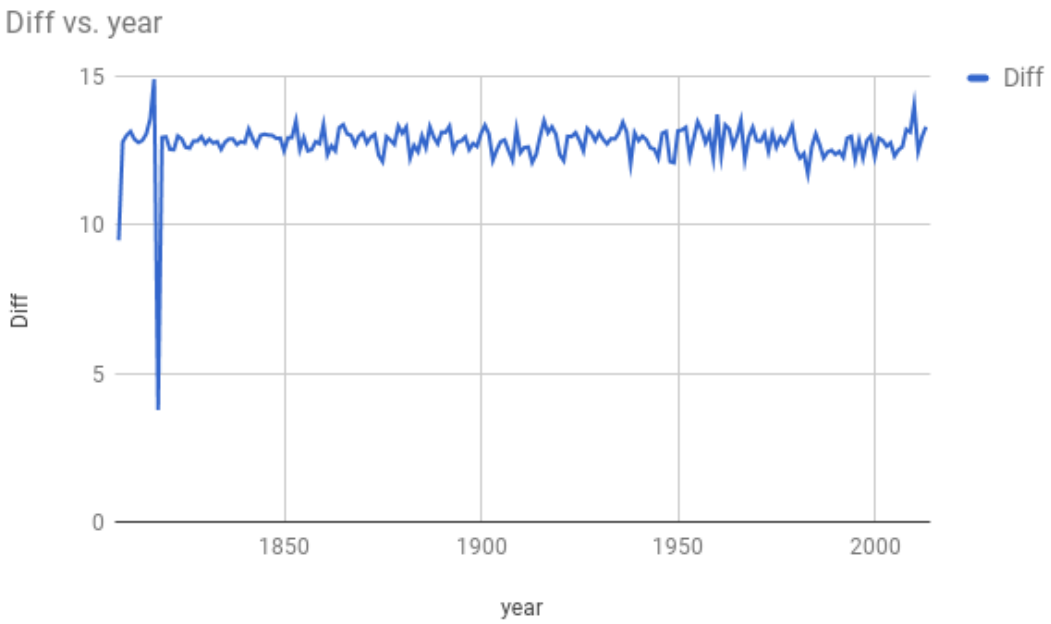
This chart represents the raw data of Cairo temperature and the global temperature:



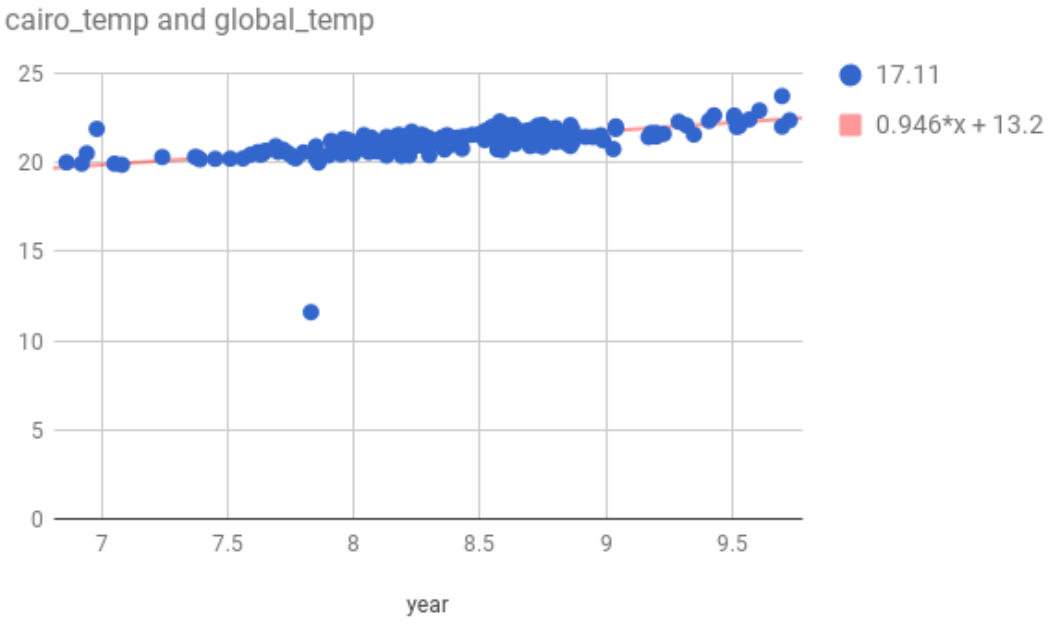
We can smooth the fluctuations by using a moving average filter, using moving average with an interval equal to six giving this chart:



This chart represents the difference between Cairo temperature and the global temperature.



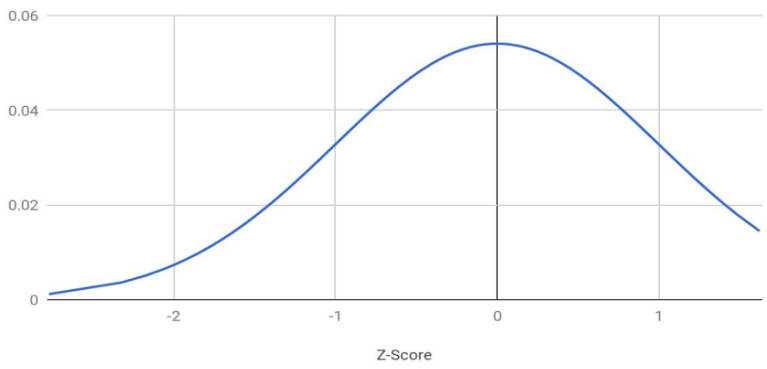
To estimate the Cairo temperature from the global temperature, this chart represents the linear regression between the two



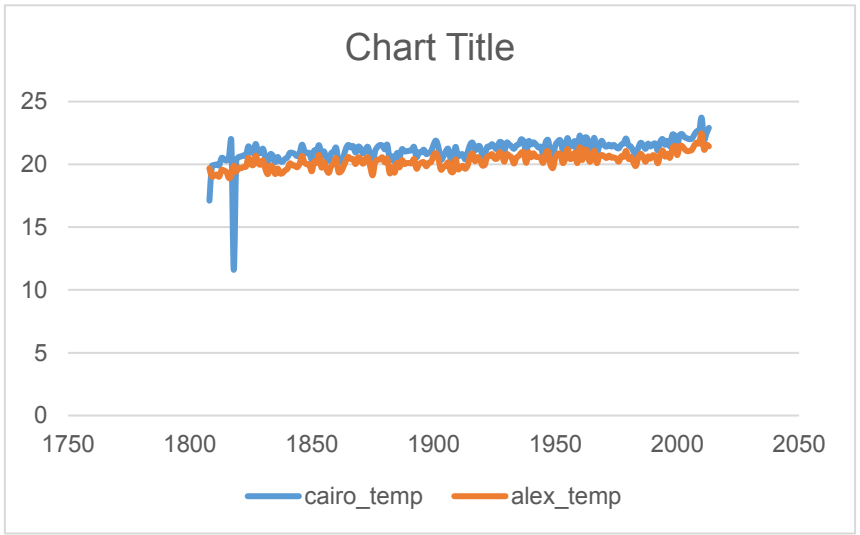
Then I have extracted the data of all the other cities using the following SQL command:

```sql
SELECT AVG(avg_temp) AS overall_avg, city
FROM city_data
WHERE city NOT IN ('Cairo', 'Alexandria')
AND country != 'Egypt'
AND year BETWEEN 1808 AND 2013
GROUP BY city
ORDER BY overall_avg;
```

The next chart represents the normal distribution of the average temperature of each city.



The following chart represents the temperatures of Cairo and Alexandria.



Observations

1. The correlation between the global and Cairo temperature is 0.58267 which is a low positive correlation.

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}} = 0.58267$$

2. Cairo average temperature is 21.16961.

3. The global average temperature is 8.396845.

4. The local temperature can be estimated from the global temperature using the following equation:

   Local Temp = 13.2 + Global Temp * 0.946

5. The minimum difference between Cairo and the global temperature was 14.9 at year 1818.

6. The maximum difference between Cairo and the global temperature was 3.77 at year 1817.

7. The average local temperature is 21.17.

8. The average global temperature is 8.397.

9. The z-score of average local temperature of Cairo, which was equal to 0.554118 which is higher than 65% of the rest of the cities.