

Project: Explore Weather Trends

Udacity Nanodegree – Data Analyst

Background

Data of yearly average temperatures are given for multiple cities in the world along with global average. The assignment is to pick one city and compare how its average temperature has developed over the years as compared with the global average temperatures.

Data Extraction

By running a series of SQL statements, the city of Copenhagen was identified in the `city_list` table to access the corresponding data in `city_data` table.

To explore the `city_list` table, the following statements were used:

```
SELECT * FROM city_list
```

```
SELECT * FROM city_list WHERE country="Sweden"
```

```
SELECT * FROM city_list WHERE country="Denmark"
```

Since I live in Sweden, but very close to Denmark I decided upon the city Copenhagen.

To obtain the data, I used the following commands

```
SELECT year, avg_temp FROM city_data WHERE city="Copenhagen"
```

```
SELECT year, avg_temp FROM global_data
```

I exported the result of both these statements to separate CSV files.

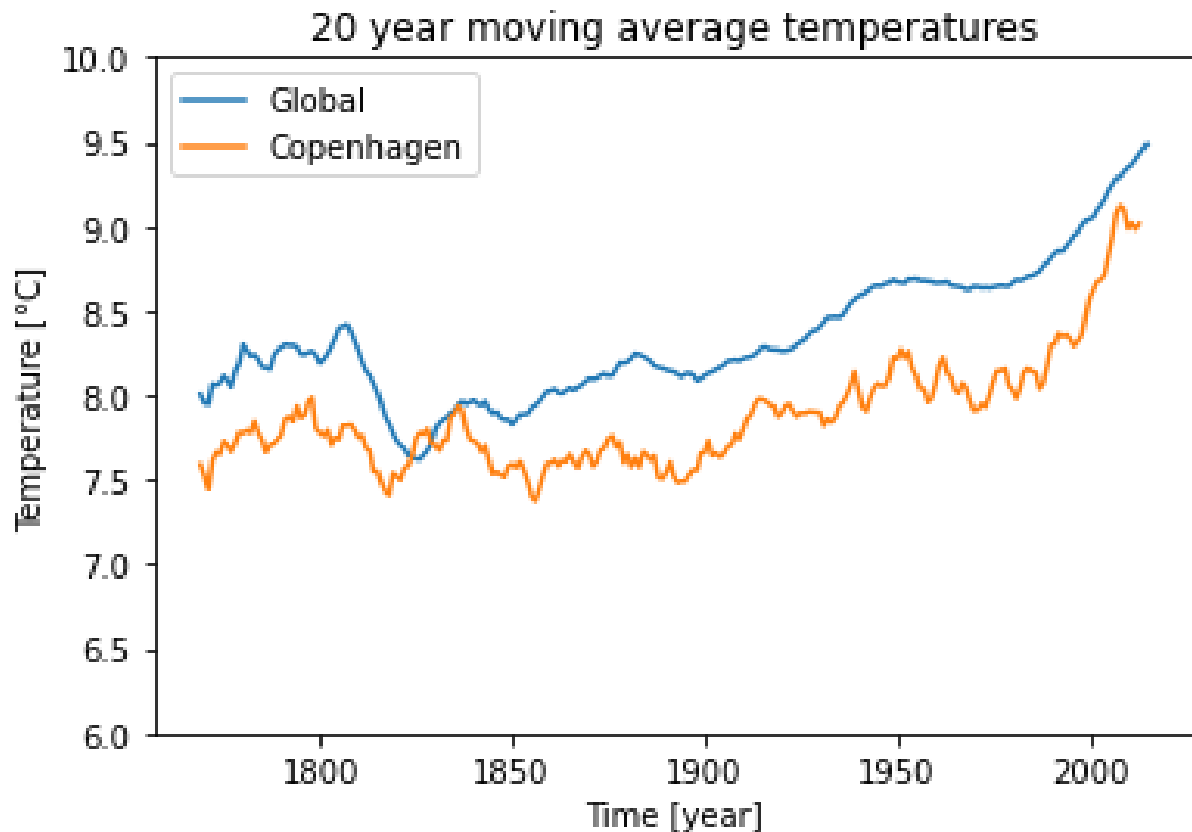
Data Exploration

I created a Python notebook to analyze the data using the Python packages `numpy`, `pandas` and `matplotlib`.

Using the built in functions `rolling()` and `mean()` in `pandas`, I constructed the moving average versions of the original time-series. Some key lines of Python code are:

```
moving_avg_cph = cph_data['avg_temp'].rolling(moving_avg_years).mean()  
moving_avg_global = global_data['avg_temp'].rolling(moving_avg_years).mean()
```

With a **moving average of 20 years**, the line graph below was obtained. Different amount of year moving average was tested. 20 seemed a good trade-off between avoiding yearly fluctuations and showing the long term trend.



Data Analysis

Some conclusions that may be drawn from the data and generated graph are:

- The average temperature in Copenhagen is consistently lower than the global average
 - Over the whole time-period, the global temperature is about 0.45 °C higher than in Copenhagen
- The average temperature in Copenhagen is rising
- The global average temperature is rising
- The rise in average temperature in Copenhagen seems to follow the global average
- In recent year, the average temperature in Copenhagen is rising more rapidly than the global average
- Around 1825 there seems to have been an event causing a temporary dip in the global average temperature
- This dip around 1825 is not observed in the Copenhagen data