

Project: Explore Weather Trends

Goal: To create a visualization and describe the similarities and differences between global temperature trends and temperature trends in the closest big city, San Francisco.

Data Extraction:

The Database Schema

There are three tables in the database:

- `city_list` - This contains a list of cities and countries in the database. Look through them in order to find the city nearest to you.
- `city_data` - This contains the average temperatures for each city by year (°C).
- `global_data` - This contains the average global temperatures by year (°C).

Used the SQL Workspace provided by Udacity to extract data from the temperatures database, then download the results to a CSV. Downloading the CSV file was pretty straightforward.

Following queries were used to extract the relevant data:

1. To extract the list of all major cities around the world:

```
select * from city_list
order by country, city;
```

2. To extract Average Temperatures in the San Francisco Area:

```
select year, avg_temp
from city_data
where country = 'United States'
and city = 'San Francisco'
order by year;
```

3. To extract the Average Temperatures of the World:

```
select * from global_data
order by year;
```

The Database Schema

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Input

HISTORY ▾MENU ▾

SCHEMA ↻

city_data ▾

city_list ▾

global_data ▾

```
4 select year, avg_temp
5 from city_data
6 where country = 'United States'
7 and city = 'San Francisco'
8 order by year;
9
10 select * from global_data
11 order by year;
```

Success!

EVALUATE

Output 266 results

Download CSV

year	avg_temp
1750	8.72
1751	7.98

Data Cleansing

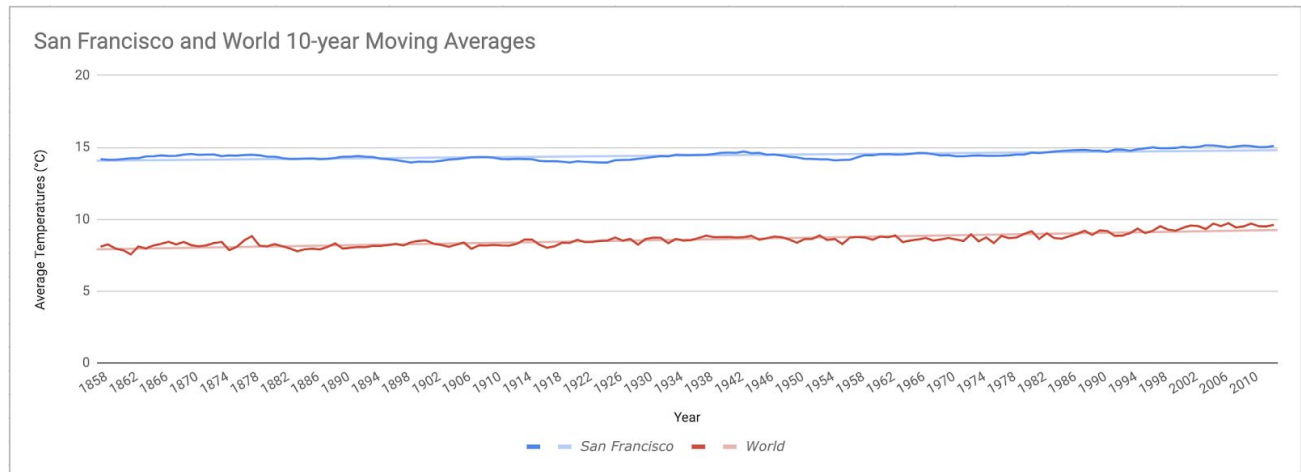
This data (from downloaded CSV files) was uploaded and combined into a Google Spreadsheet to make it ready for charting.

	A	B	C	D	E	F	G	H	I	J	K
1	year	avg_temp_world	10year_ma_world	avg_temp_sf	10year_ma_sf						
92	1840	7.8	7.666								
93	1841	7.69	7.671								
94	1842	8.02	7.728								
95	1843	8.17	7.744								
96	1844	7.65	7.694								
97	1845	7.85	7.74								
98	1846	8.55	7.825								
99	1847	8.09	7.896								
100	1848	7.98	7.943								
101	1849	7.98	7.978	14.12							
102	1850	7.9	7.988	13.8							
103	1851	8.18	8.037	14.39							
104	1852	8.1	8.045	13.81							
105	1853	8.04	8.032	14.4							
106	1854	8.21	8.088	13.98							
107	1855	8.11	8.114	14.2							
108	1856	8	8.059	14.1							
109	1857	7.76	8.026	14.78							
110	1858	8.1	8.038	14.19	14.177						
111	1859	8.25	8.065	13.71	14.136						
112	1860	7.96	8.071	13.81	14.137						
113	1861	7.85	8.038	14.88	14.186						

It was quite intuitive to calculate 10 year moving averages since we have over 100 years of data.

Data Visualization

Created Line Chart by plotting the Moving Average to smooth out the lines and make trends more observable.



Note that the data was plotted only for those years for which 10-year MA could be calculated for San Francisco as well as the World.

Observations and Findings

1. San Francisco has consistently had observed higher temperatures ($> 5^{\circ}\text{C}$) compared to the global average temperatures.
2. Highest 10 year moving average for the world was observed in the year 2013 (9.556) and the lowest was in 1864 (7.968). For San Francisco, highest moving average was observed in 2004 (15.148) and lowest in 1924 (13.951). This means that the average temperature everywhere around the world has risen by almost 1.5°C .
3. Overall, there have been more variations in the average world temperatures compared to San Francisco temperatures and the line chart for San Francisco is smoother compared to the world average.

4. Since the trendline for world average temperature has a bigger slope compared to San Francisco average temperatures, this means that global temperatures have seen sharper increase compared to San Francisco temperatures.