Explore Weather Trends

Step 1: Extract data from a database using SQL

Getting City List and Filter by My City(Faisalabad) and Country(Pakistan):

```sql
select *
from city_list
where country ='Pakistan'
and city = 'Faisalabad';
```

Extract City Data passing filter of my city(Faisalabad):

```sql
select *
from city_data
where city = 'Faisalabad'
```

Extract Global data(city,year,average_temperature) for the same years for which data exist in the *city_data* table against my city (Faisalabad).

```sql
select
c.city, g.year, g.avg_temp
from city_data as c
join global_data as g
on c.year = g.year
where c.city = 'Faisalabad'
and c.country = 'Pakistan';
```
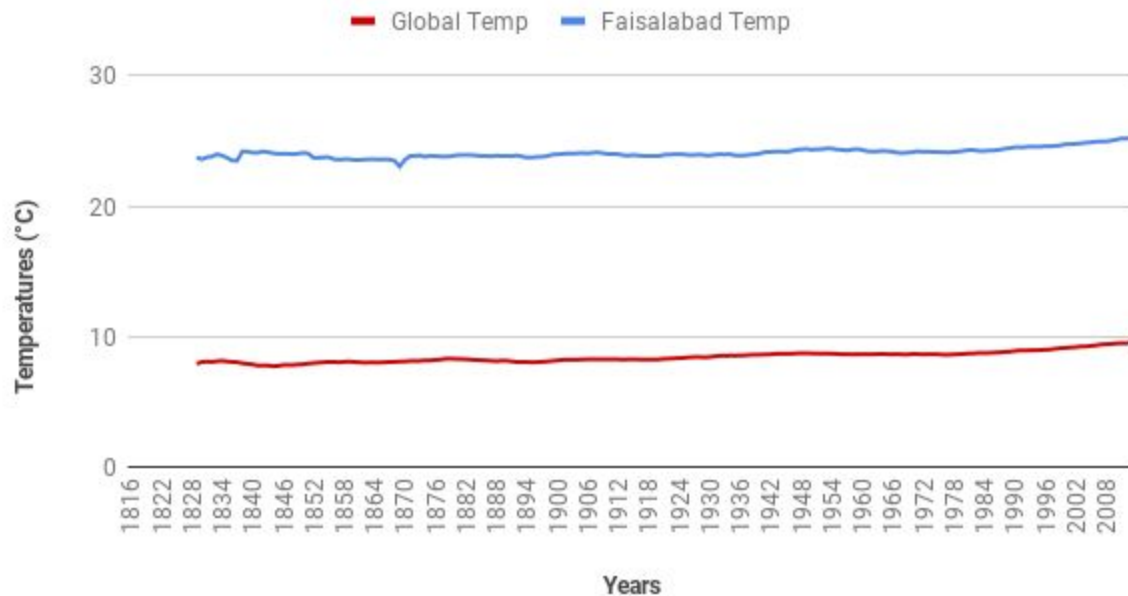
I run above mentioned queries and save all data into **.csv** files then upload these results to google spreadsheets for further manipulation and visualization.

Step 2: Calculate Moving averages in Spreadsheet

- Upload csvs to google spreadsheets to calculate MA and visualizations.
- Calculated **14-years** Moving averages which will be used to smooth out data to make it easier to observe long term trends and not get lost in daily fluctuations.
- I created 2 new columns from *global_avg_temp* and *fsd_avg_temp* to *Global_Temp* and *Faisalabad_Temp* respectively by using Formulae **=AVERAGE(D2:D15)** and **=AVERAGE(F2:F15)** respectively. Then apply the same formula on whole columns by dragging formulae cells.

Step 3: Data Visualization (Line Chart in Spreadsheets)

- Select 3 cells from spreadsheet (Years, Global Temp, Faisalabad Temp) and click on insert chart -> Line Chart.
- Add Title "Explore Weather Trends (Faisalabad vs Global)".
- Add clear legends for better understanding and label them with different colors. Red color denotes Global Temp and Blue for Faisalabad Temp.
- Add **Years** on x-axis and **Temperatures (°C)** on y-axis as labels.

Step 4: Observations from Visualization(Line Chart)

1. The line chart shows information about weather history between **1816 and 2008**.
2. On average, Faisalabad has always been **hotter** than other countries around the world.
3. The global average temperature was always Cooler than Faisalabad.
4. After calculating **14-years** Moving averages for Global Average Temp, it displayed lowest weather **7.72 °C** and highest average weather was **9.51 °C** globally.
5. Similarly, approximately **23 °C** temperature was recorded lowest temperature at Faisalabad whereas about **25 °C** was highest during this duration.
6. The Faisalabad's average temperature was decreased to **23°C in 1869.** After that year, temperature never came down to this and a constant increase can be seen in the graph.
7. Overall, a **clear increase in Temperature (°C)** can be seen at global level as well as at my city's weather. We can assume from this historic visual that due to increase in temperature, the world is going to be hotter.