EXPLORE WEATHER TRENDS

PROJECT 1

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UDACITY ERISE

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Project Objectives

Summary

In this project, you will analyze local and global temperature data and compare the temperature trends where you live to overall global temperature trends.

Instructions

Your goal will be to create a visualization and prepare a write up describing the similarities and differences between global temperature trends and temperature trends in the closest big city to where you live.

Submission

Your submission should be a PDF that includes:

- An outline of steps taken to prepare the data to be visualized in the chart, such as:
  - What tools did you use for each step? (Python, SQL, Excel, etc)
  - How did you calculate the moving average?
  - What were your key considerations when deciding how to visualize the trends?
- Line chart with local and global temperature trends
- At least four observations about the similarities and/or differences in the trends

Data Extraction & Cleaning

Data Extraction

By using SQL I Exported the temperature data for the world as well as for the closest big city to where I live. Which I found in the list of cities and countries in the **city_list** table.

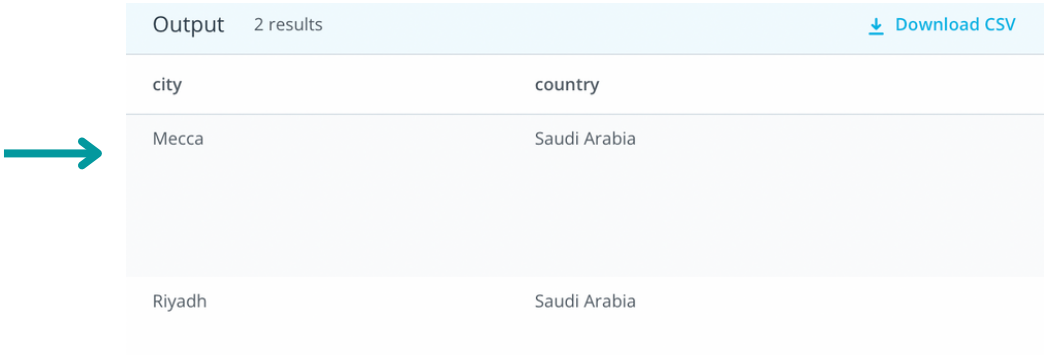
- The Data is obtained from UDACITY's workspace that is connected to a database.

1. Extract the city level data.

Step -1
select all cities belonging to **Saudi Arabia** using **WHERE** Clause.

```
1   SELECT *
2   from city_list
3   WHERE Country='Saudi Arabia';
```

Step -2
Choosing **Mecca** as the local city, which is only 70km from my city Jeddah.



Output 2 results — Download CSV

city	country
Mecca	Saudi Arabia
Riyadh	Saudi Arabia

Step -3
Extracting the Average temperatures for Mecca city by year from **city_data** table

```
1   SELECT *
2   from city_data
3   WHERE city='Mecca';
```

The output:

year	city	country	avg_temp
1843	Mecca	Saudi Arabia	25.16
1844	Mecca	Saudi Arabia	19.05
1845	Mecca	Saudi Arabia	22.46
1846	Mecca	Saudi Arabia	
1847	Mecca	Saudi Arabia	
1848	Mecca	Saudi Arabia	

Data Extraction & Cleaning

Data Extraction

2. Extract the global data. Export to CSV

Step -1
Select all from the `global_data` table

```
SELECT *
from global_data;
```

Step -2
Export output to CSV file.

Data Cleaning

In order to clean the resulting data in **Excel:**

- I combined the CSV files into a single sheet with one table with no repeated headers. However, I had to compare the tables and find rows that don't match. (Which will be ignored).
- For Mecca's data, there were missing values in the column `avg_temp` from the year 1846 to 1860, Therefore I excluded them from the comparison.
- Additionally, omit the Values that are before the year 1861 in the global data table because the minimum year is 1861 in Mecca's data table.

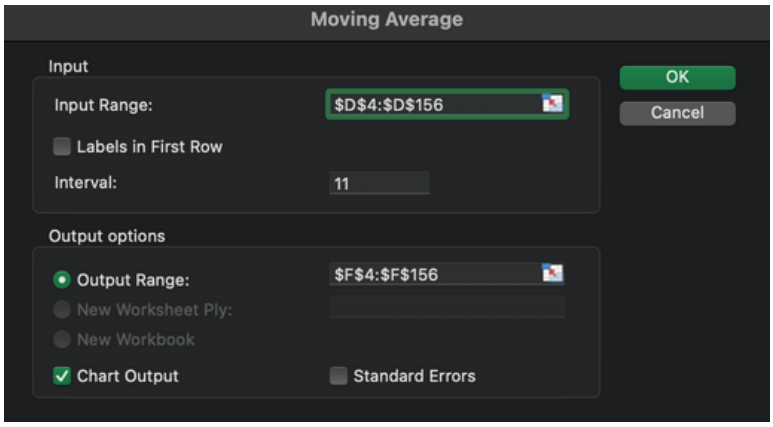
Table after cleaning

year	global avg_temp	Macca avg_temp
1861	7.85	23.98
1862	7.56	24.13
1863	8.11	22.87
1864	7.98	25.43
1865	8.18	25.6
1866	8.29	25.42
1867	8.44	25.62
1868	8.25	25.3
1869	8.43	25.65
1870	8.2	25.35
1871	8.12	24.97

Moving Average Calculation

Excel Data Analysis Tool

Calculating the moving makes trends more observable and exponentially smoothed averages, and one of the ways to calculate the moving average is by using The **Data Analysis tool** in **Excel.**



Calculated the moving average for both the global and city level temperatures

Step-1
Identify the data that I want to use to calculate the moving average.

Step-2
identify the input range, There for I set the average for every **11 years** (entered that value into the Interval text box).

Step-3
Use the Output Range text box to identify the worksheet range into which I want to place the moving average data.

Step-4
Checked the **Chart Output** check box, to generate the chart.

year	global avg_temp	Macca avg_temp	global moveing average for
1861	7.85	23.98	#N/A
1862	7.56	24.13	#N/A
1863	8.11	22.87	#N/A
1864	7.98	25.43	#N/A
1865	8.18	25.6	#N/A
1866	8.29	25.42	#N/A
1867	8.44	25.62	#N/A
1868	8.25	25.3	#N/A
1869	8.43	25.65	#N/A
1870	8.2	25.35	#N/A
1871	8.12	97	=AVERAGE(C4:C14)

Data Visualization

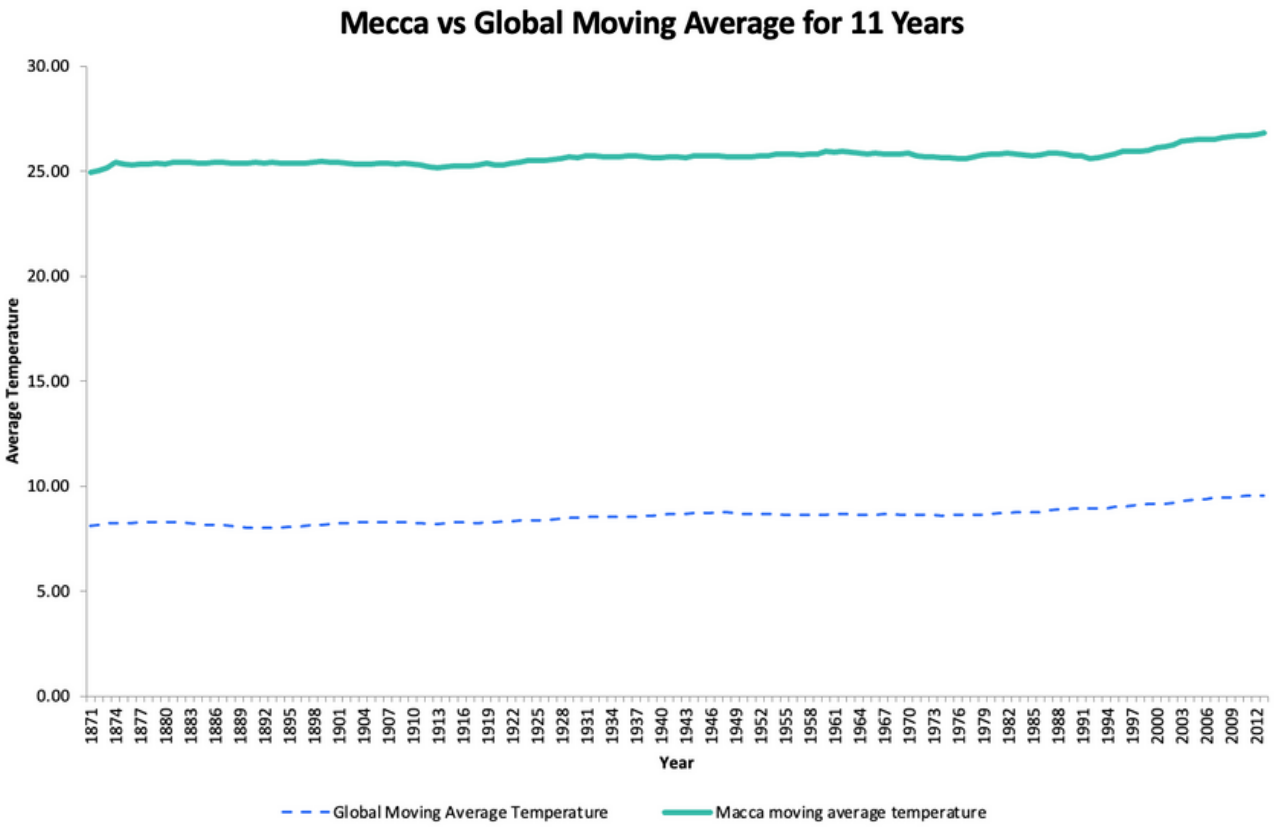
Outline:

The key considerations when deciding how to visualize the trends:

- Line charts illustrate the obvious trends that emerge over time. it visualizes many features of the data, including overall trends, unusual observations, changes over time, and comparing the relationships between variables.

- The time series data is in year format which starts from 1862 until 2013, therefore we can investigate the pattern by comparing the trends across the different variables (global vs Mecca temperatures) each as it's own line, and comparing it over time.

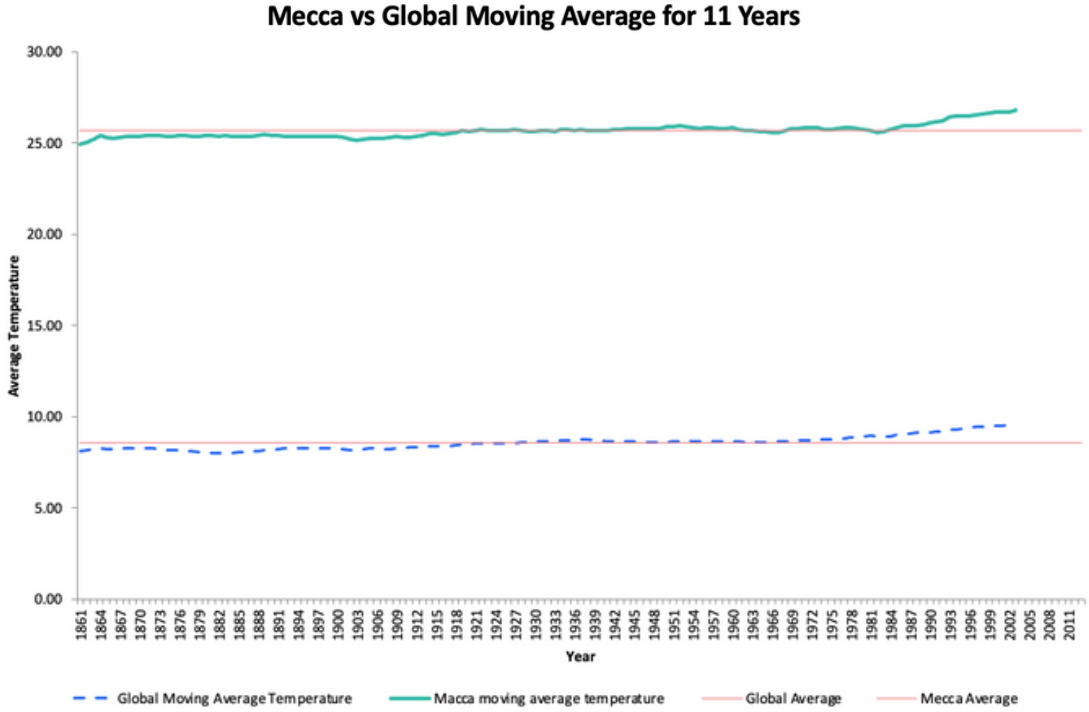
With using the above method to calculate the moving average, the line chart has generated



Observations & Conclusion

Observations

- The average temperature overall has increased over time, due to climate change.
- According to the data, the global average temperature has changed from 7.85°C in the year 1861 to 9.61°C in the year 2013, likewise, Mecca's average temperature has also increased from 23.98°C in 1861 to 27.57°C in the year 2013.
- The year **2013** secured the rank of the warmest year in the 152-year record, with a global moving average temperature of **9.61°C**, and **27.57°C** for Mecca city.
- When comparing the Global with Mecca's average temperature, Mecca is obviously much hotter than the Global average, because Saudi Arabia has a desert climate, which means it's very hot in summer all over the country. Also, Mecca is known for being the hottest city in Saudi.
- This graph clearly illustrates the rise in temperature in other parts of the world, which ultimately indicates an increase in global temperatures.



Observations & Conclusion

Conclusion

Throughout the earth's history, the climate has changed, and our planet keeps getting warmer, especially as we're seeing an increase in extreme weather events, more wildfires, flooding, and droughts

In order to reduce that temperature, drastic changes in the economy and global industry will be necessary, as well as a strong commitment from governments, corporations, and society as a whole.

Refrences

- https://www.dummies.com/article/technology/software/microsoft-products/excel/how-to-calculate-moving-averages-in-excel-152121/
- https://uc-r.github.io/ts_exploration