

Project (1) : Explore Whether Trends

1.0 Overview:

In this project, the local temperature of my city Mecca, Saudi Arabia will be analysed comparably with global temperature. In order to accomplish the goals, data will be extracted from a database that is provided by Udacity. Moreover, the data will be manipulated and visualized by using different tools.

1.1 Goals:

1. Extract data from the given database and extracted to CSV file
2. Create a line chart to visualize the extracted data
3. Describe the observation on chart

1.2 Tools:

1. SQL: I wrote some SQL queries to extract data from database
2. Python: for more practicing I used Python to calculate moving average and plot line chart
3. Anaconda / Jupyter Notebook: to write python code

2.0 Actions

Several steps have been taking to accomplish this project, described as following:

2.1 Extract the data with SQL

a) the following query is to find out the available cities in my country 'Saudi Arabia', :

The screenshot shows a SQL query interface. On the left, under 'Input', there is a 'SCHEMA' section with a list of tables: 'city_data', 'city_list', 'global_data', 'year', and 'g_avg_temp'. The 'city_list' table is selected. On the right, the SQL query is displayed:

```
1 SELECT *
2 FROM city_list WHERE country LIKE 'Saudi Arabia'
```

. Below the query, a green 'Success!' message is shown. A blue 'EVALUATE' button is located to the right of the success message. Below the query area, the 'Output' section shows '2 results' and a 'Download CSV' link. The output is a table with two columns: 'city' and 'country'. The first row of data shows 'Mecca' for the city and 'Saudi Arabia' for the country.

city	country
Mecca	Saudi Arabia

b) alter the name of avg_temp column in each tables city_data and global_data to distinguish between them:

Input

HISTORY ▾

MENU ▾

SCHEMA ↻

city_data ▾

city_list ▾

global_data ▴

year

g_avg_temp

1 ALTER TABLE city_data RENAME COLUMN avg_temp to c_avg_temp

2

3

4

5

Success!

EVALUATE

Input

HISTORY ▾

MENU ▾

SCHEMA ↻

city_data ▾

city_list ▾

global_data ▴

year

g_avg_temp

1 ALTER TABLE global_data RENAME COLUMN avg_temp to g_avg_temp

2

3

4

Success!

EVALUATE

c) Join two tables to get the relevant data:

Input

HISTORY ▾

MENU ▾

SCHEMA ↻

city_data ▾

city_list ▾

global_data ▴

year

g_avg_temp

1 SELECT global_data.year, global_data.g_avg_temp, city_data.c_avg_temp

2 FROM global_data JOIN city_data

3 ON global_data.year = city_data.year

4 WHERE city like 'Mecca'

5

6

7

Success!

EVALUATE

Output 171 results

Download CSV

year	g_avg_temp	c_avg_temp
1843	8.17	25.16
1844	7.65	19.05

d) download CSV file, rename it as "output.csv".

2.2 Write Python Code

a) Python code had been written on Jupyter notebook to calculate moving average for local temperature and global temperature from extracted data. Also, to draw line chart for this calculation.

```
# Project (1) - by Amani Abumansour #

# To import Libraries
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt

# To import the data extracted
data = pd.read_csv('output.csv')

# define a function to calculate the moving average
def moving_avarage(ma_range,d_input):
    output=d_input.rolling(window=ma_range, on="c_avg_temp").mean().dropna()
    return output

# To call moving average function
av_range = 140 # range
chart_ma = moving_avarage(av_range, data)

# To draw the Line chart of global temperature
plt.plot(chart_ma['year'], chart_ma['g_avg_temp'],label='Global')

# To draw the Line chart of Local temperature
plt.plot(chart_ma['year'], chart_ma['c_avg_temp'],label='Mecca')

# To place legend outside the chart
plt.legend(loc='upper center', bbox_to_anchor=(1.15, 0.5), shadow=True, ncol=1)

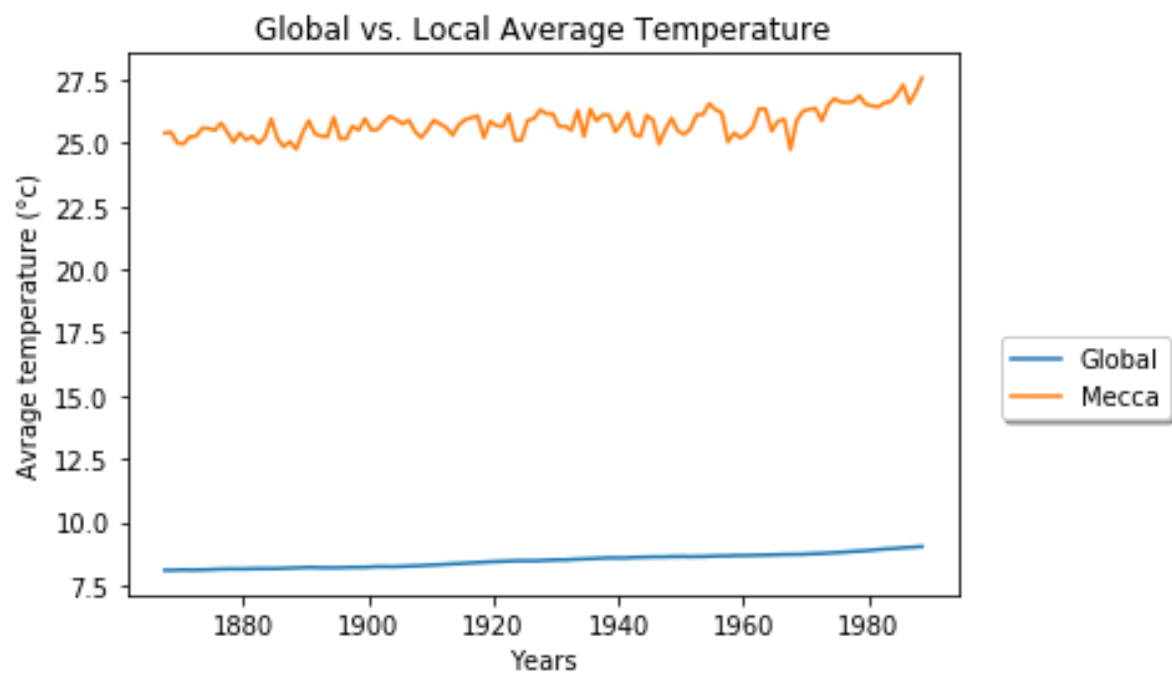
# Labeling X-axis
plt.xlabel('Years')

# Labeling Y-axis
plt.ylabel('Avrage temperature (°c)')

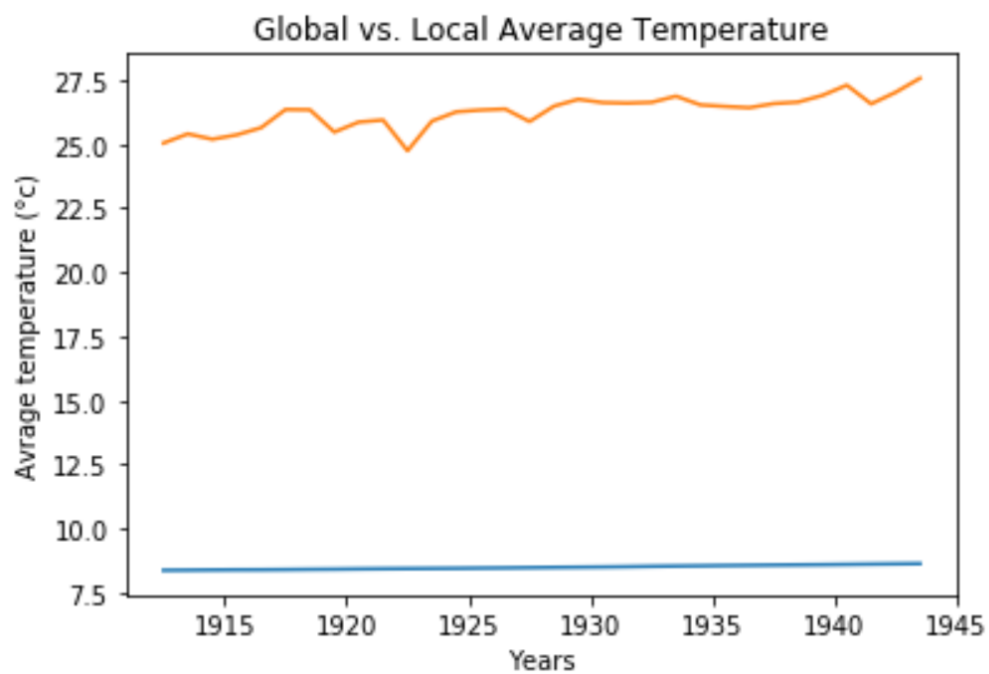
# To provide topic to the chart
plt.title('Global vs. Local Average Temperature')

# To display the chart
plt.show()
```

2.3 Output



Figure_1



Figure_2

3.0 Observations

- From the above charts, both depict the moving average temperature of global and local city “Mecca”. In figure_1, I set 40 for the range of moving rolling. Then, I changed it to 140 which the result is shown in figure_2. Apparently, when the range is small the line will be distorted. So, by increasing the sample, setting higher range, the line became more clear and smooth.
- From surveillance of figure_2, it's clear that:
 - The global average temperature is slightly increasing up to 9 °C over the years between 1915 to 1945
 - The average temperature of Mecca city is fluctuated. The temperature drop down to 24 °C in 1922 and uplift to 27.5 °C in 1945
 - There is big difference in average temperature between Mecca city and the global.
 - It's obvious that Mecca city is hotter than the global. This may refer to its location in Arabian Peninsula which is considered as the fifth largest desert in the world.