



Udacity Data Analyst
Nanodegree



WEATHER TREND REPORT

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Step 1 (SQL Extraction)

1.1 Explore the city

I have a look at the city_list table to see if my city which is Bangkok is available in the database.



Input

SCHEMA	
city_data	▼
city_list	▼
global_data	▼

1 SELECT * from city_list;

Success!

EVALUATE

Output 342 results

Bandung	Indonesia
Bangalore	India
Bangkok	Thailand
Bangui	Central African Republic
Barcelona	Spain
Bogotá	Colombia

Download

Fig 1.1: SQL Command to show the information of city_list table

1.2 Retrieve my city

I explore the data of Bangkok from the city_data table.



Input

SCHEMA	
city_data	▼
city_list	▼
global_data	▼

1 SELECT * FROM city_data WHERE city = 'Bangkok';
2

Success!

EVA

Output 198 results

year	city	country	avg_temp
1816	Bangkok	Thailand	25.96
1817	Bangkok	Thailand	25.83
1818	Bangkok	Thailand	26.48

Do

Fig 1.2: SQL Command to show the information of Bangkok in city_data table

1.3 Rename avg_temp

I found that the column name of the average temperature of the city_data and global_data columns are the same. I plan to join the columns into a single table. Thus I change both column names.

Input

SCHEMA	
city_data	▼
city_list	▼
global_data	▼

1 ALTER TABLE city_data RENAME COLUMN avg_temp to city_avgtemp;
2 ALTER TABLE global_data RENAME COLUMN avg_temp to global_avgtemp;

Success!

EVALUATE

Output

No data to download

ALTER Operation Successful

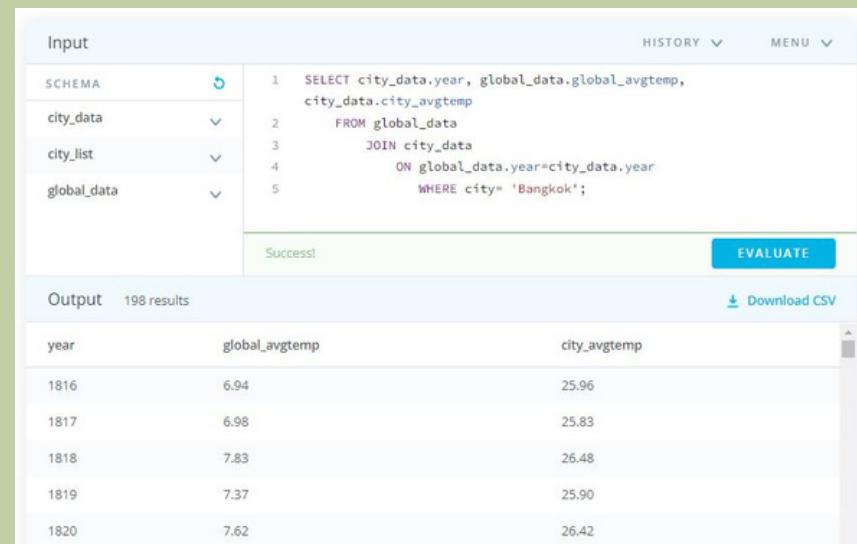
Fig 1.3: SQL Command to rename avg_temp column name in both city_table and global_data table





1.4 Join the table and export

I joined the tables with this command and export the CSV file.



```
1 SELECT city_data.year, global_data.global_avgtemp,
2     city_data.city_avgtemp
3     FROM global_data
4     JOIN city_data
5     ON global_data.year=city_data.year
6     WHERE city= 'Bangkok';
```

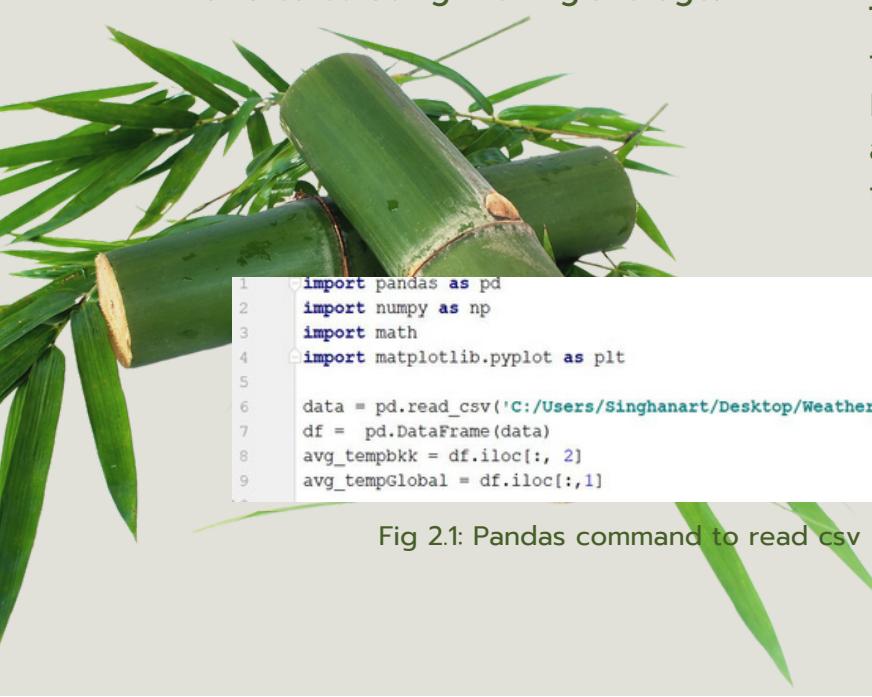
Output 198 results

year	global_avgtemp	city_avgtemp
1816	6.94	25.96
1817	6.98	25.83
1818	7.83	26.48
1819	7.37	25.90
1820	7.62	26.42

EVALUATE Download CSV

Fig 1.4: SQL Command to join the table which contain the information of year and avg_temp from city_data table and avg_temp from global_data table

Step 2 (Manipulate data and calculate moving average)



After downloaded the CSV files, I used Python to manipulate data, calculate the moving average, and plot line charts. The libraries I used are Numpy, Pandas, Math, and Matplotlib. This section will describe the process of manipulating data and calculating moving average.

2.1 Read the CSV file and data preparation.

First I used the Pandas's `read_csv` command to read the csv files and create DataFrame with the `DataFrame()` command.

Then I sliced the average temperature, both global and Bangkok, into a variable `avg_tempbkk` and `avg_tempGlobal` for moving average calculation.



```
1 import pandas as pd
2 import numpy as np
3 import math
4 import matplotlib.pyplot as plt
5
6 data = pd.read_csv('C:/Users/Singhanart/Desktop/Weather_Udacity/venv/results.csv')
7 df = pd.DataFrame(data)
8 avg_tempbkk = df.iloc[:, 2]
9 avg_tempGlobal = df.iloc[:, 1]
```

Fig 2.1: Pandas command to read csv and Dataframe creation



2.2 Create function to calculate moving average

I created a function "movingaverage" to calculate the moving average. The calculation will be based on window variable which is the number of years for moving average which is 10 years in this case. Then return the list of values. After that, I appended the value back to the dataframes in the column name of BKK_ma_temp and Global_ma_temp.

```
3  def movingaverage (avg,window,count,maArr):
4      for i in avg:
5          startPos = count - window
6          ma = np.mean((avg[startPos:count]))
7          maArr.append(ma)
8          count += 1
9      return maArr
10
11 maArrBkk = []
12 maArrGlobal = []
13 window = 10
14
15 finalBkkMa = movingaverage(avg_tempbkk,window,1,maArrBkk)
16 finalGlobalMa = movingaverage(avg_tempGlobal,window,1,maArrGlobal)
17
18 df['BKK_ma_temp'] = finalBkkMa
19 df['Global_ma_temp'] = finalGlobalMa
```

Fig 2.2: Code of my function to calculate the moving average and append the information back to the dataframes

Step 3 (Create Line Charts)

3.1 Plot the charts

After finished data preparation, I used the Matplotlib to create line charts for this project. Below is the command to plot and create legend for the charts

```
32 plt.plot(df['year'], df['BKK_ma_temp'], color='red', label = "Bangkok")
33 plt.plot(df['year'], df['Global_ma_temp'], color='blue', label = "Global")
34 plt.title('Year vs Moving Average Temperature Comparision(Bangkok and Global)', fontsize=8)
35 plt.xlabel('Year', fontsize=8)
36 plt.ylabel('Moving Average Temperature (°C)', fontsize=8)
37 plt.grid(True)
38 plt.legend()
39 plt.show()
40
41 plt.plot(df['year'], df['BKK_ma_temp'], color='red')
42 plt.title('Year vs Moving Average Temperature(Bangkok)', fontsize=8)
43 plt.xlabel('Year', fontsize=8)
44 plt.ylabel('Moving Average Temperature (°C)', fontsize=8)
45 plt.grid(True)
46 plt.show()
47
48 plt.plot(df['year'], df['Global_ma_temp'], color='blue')
49 plt.title('Year vs Moving Average Temperature(Global)', fontsize=8)
50 plt.xlabel('Year', fontsize=8)
51 plt.ylabel('Moving Average Temperature (°C)', fontsize=8)
52 plt.grid(True)
53 plt.show()
```

Fig 3.1: My code to plot three charts (the result is in the next page)



3.2 The charts outcome

I generated three charts that show the comparison of Bangkok and the global moving average temperature and also individual chart for each.

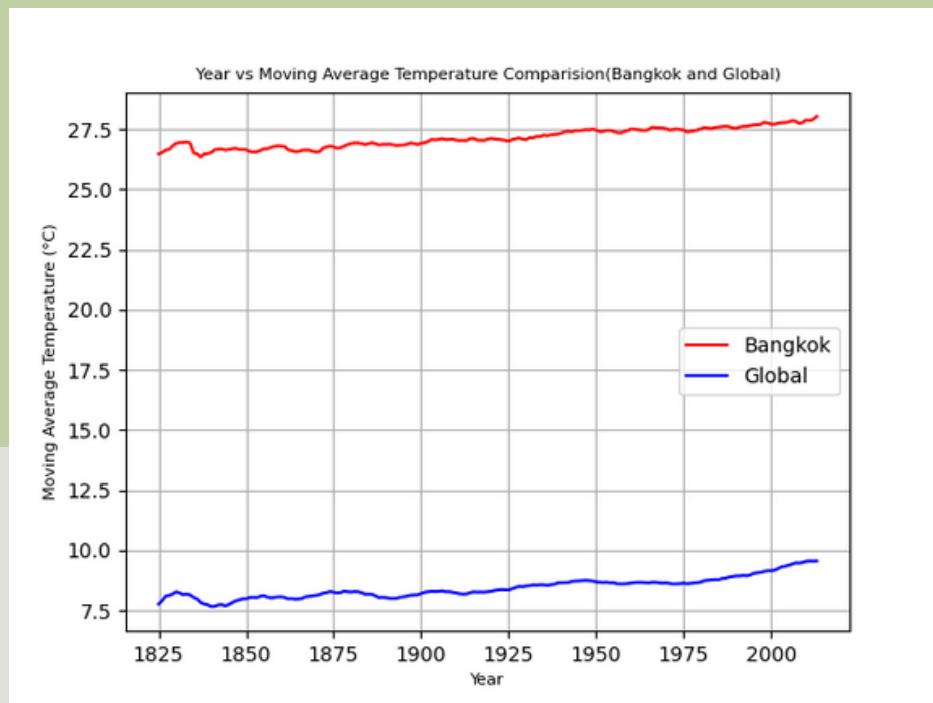


Fig 3.1: The chart shows moving average temperature of Bangkok and Global from 1825-2013

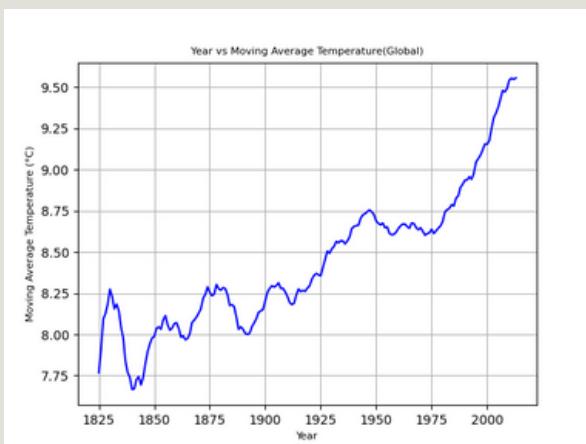


Fig 3.2: The chart shows global moving average temperature from 1825-2013

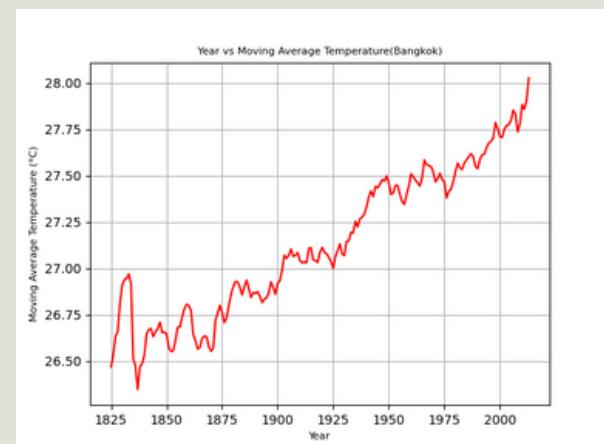


Fig 3.3: The chart shows Bangkok moving average temperature from 1825-2013



Step 4 (Inpreation and Observations)

After I plotted the charts and made four observations which draw insights from the data in the following.

2.1 The global and local (Bangkok) temperature is on the rising trend

From both chart it is obvious that both global and Bangkok temperature is getting higher.

2.2 Bangkok is warmer than global average

At the beginning of the chart. The moving average of the temperature of Bangkok is higher than the global average.

2.3 After around 1980, the temperature of global and Bangkok is accelerating up

From the chart, it is very interesting to see that both global and Bangkok moving average temperature is accelerating up as both individual chart never go below the peak they made around 1950.

2.4 At peak, the temperature of Bangkok is warmer than global around 185-201%

At peak, the temperature of Bangkok in this data set is 28.98°C in 2013, while in the same year the global temperature is 9.61°C which indicates that the temperature in Bangkok is warmer than the global at 201.56% in the peak year

In vice versa , the global temperature reach it peak at 9.7°C in 2007, the temperature of Bangkok in the same year is 27.81°C which indicates 185.61% gap between global and Bangkok temperature difference.

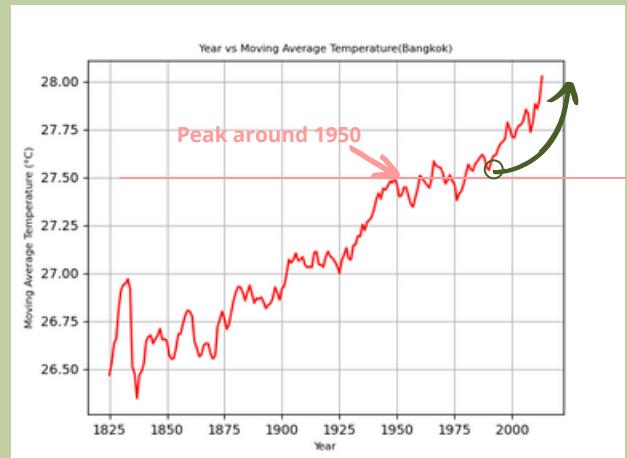
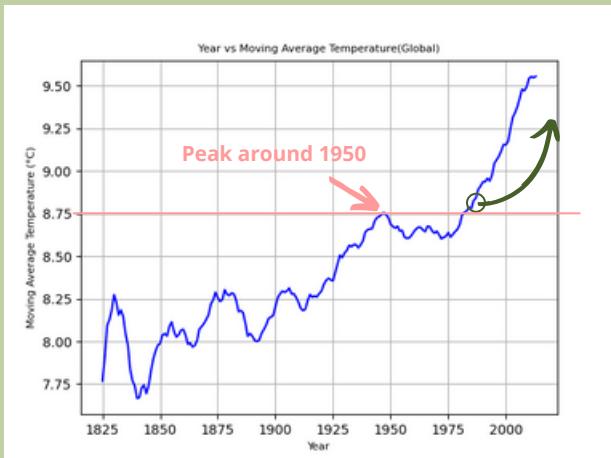


Fig 4.1: The charts illustrate that after around 1980 the average of temperature never go below the peak its made around 1950



Thank you very much

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