Exploring Weather Trends
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What tools I used?

- Python including libraries:
    - Pandas for data manipulation
    - Matplotlib for data visualization

SQL Queries

SELECT * FROM global_data

SELECT * FROM city_data

SELECT * FROM city_list

How I calculated Moving Average

- For moving average, I calculated using pandas rolling function where we sum values of window groups such as 5 years or 7 years then dividing it by the number of years indeed having a smoother line to visualize trends better rather than seasonal effects.

What the key considerations

- The key considerations to visualization was the it was a time series data so in this way we need to visualize it using line chart to keep track of the temperature movement directions.

Line Chart

Comparison of Temperature Changes
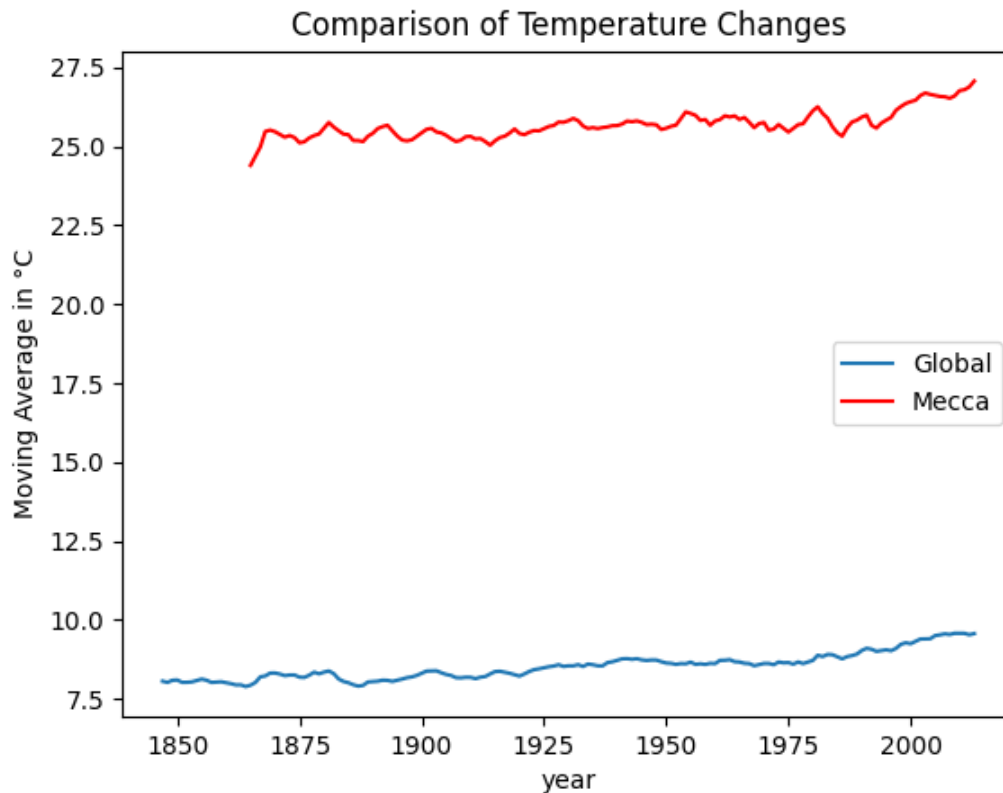
Four observations about the trend

- Mecca and Global temperature we going up and down before 1925.
- Mecca and Global temperature are getting hotter consistently after 2000.
- Mecca temperature had the lowest degree between 1975 and 2000 where Global didn't change much.
- Mecca have higher average temperature degree then the rest of the world.
- Mecca abnormal spikes throughout the trend however world trend graph has been constant until 2000.
- Mecca is hotter than the rest of the world.

Comparing Cities

Comparison of Temperature Changes
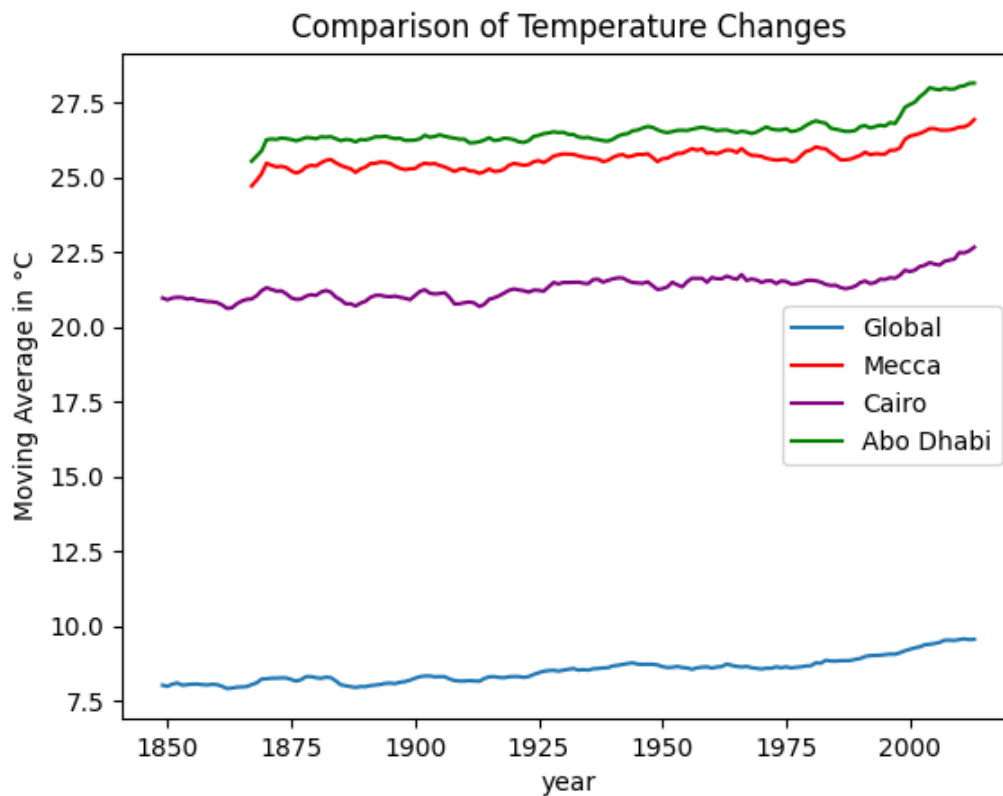
I added Abo-Dhabi and Cairo to compare them to mecca and global
what I find is:

- Abo-Dhabi and Mecca have similar temperature trend.
- Cairo is lesser hotter than Mecca and Abo-Dhabi.
- Cairo is hotter than the rest of the world.
- All 3 cities also increasing temperature after 2000.

The code

```python
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

df = pd.read_csv("city data.csv")
global_df = pd.read_csv('global data.csv')

city_name = "Mecca"
mecca_df = df.loc[df['city'] == city_name]

city_name = "Cairo"
cairo_df = df.loc[df['city'] == city_name]

city_name = "Abu Dhabi"
abo_df = df.loc[df['city'] == city_name]

start_year = mecca_df['year'].iloc[0]
end_year = mecca_df['year'].iloc[-1]
year = mecca_df['year']
year2 = abo_df['year']

mecca_df.set_index('year', inplace=True)
cairo_mask = cairo_df.loc[(cairo_df['year'] >= start_year) &
(cairo_df['year'] <= end_year)]
year1 = cairo_mask['year']
cairo_mask.set_index('year', inplace=True)
abo_df.set_index('year', inplace=True)
print(mecca_df)

temp_mask = global_df.loc[(global_df['year'] >= start_year) &
(global_df['year'] <= end_year)]
temp_mask.set_index('year', inplace=True)

global_temp_ma = temp_mask['avg_temp'].rolling(7).mean()
mecca_temp_ma = mecca_df['avg_temp'].rolling(7).mean()
cairo_temp_ma = cairo_mask['avg_temp'].rolling(7).mean()
abo_temp_ma = abo_df['avg_temp'].rolling(7).mean()
mecca_df.head()
cairo_df.head()
abo_df.head()

print("The is temp : ")
print(mecca_temp_ma)
```

```python
plt.plot(year, global_temp_ma, label="Global")
plt.plot(year, mecca_temp_ma, label="Mecca", color="red")
plt.plot(year1, cairo_temp_ma, label="Cairo", color="purple")
plt.plot(year2, abo_temp_ma, label="Abo Dhabi", color="green")
plt.legend()
plt.title("Comparison of Temperature Changes")
plt.xlabel('year')
plt.ylabel('Moving Average in °C')
plt.savefig(r'Mecca glopal temp2.png')
plt.show()
```