Project 1:

Exploring Weather Trends

Summary

In this project, we are analyzing average temperature data of the world and of Houston TX, USA to compare its temperature trends to overall global temperature trends. The global average temperature data is available in Celsius (ºC) from year 1750 to 2015 whereas the temperatures data for is available from 1820 to 2013.

Data Extraction

The data for the project is extracted from tables city_data and global_data, and the result set is then downloaded into csv format. The queries used for data extraction are as below:

```
--Extraction Houston city's temperature data
SELECT *
FROM CITY_DATA
WHERE CITY='Houston';

--Extracting global temperature data
SELECT *
FROM GLOBAL_DATA;
```

Data Analysis

For data analysis, Python's Pandas library is used. The data from csv files is loaded in pandas DataFrames. The moving average temperature and other needed calculations are calculated in the DataFrame itself. For plotting the temperature trends, python's matplotlib library is used.

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np

#Load Houston temperature data into hou_temp
hou_temp=pd.read_csv(r'C:\Vinit\Udacity\Project 1-Weather\houston_temp.csv')
#Calculating moving average based on past 30 years
hou_temp['mov_avg_temp']=hou_temp['avg_temp'].rolling(30).mean()

#Load Global tempereture data into global_temp
global_temp=pd.read_csv(r'C:\Vinit\Udacity\Project 1-Weather\global_temp.csv')
#Calculating moving average based on past 30 years
global_temp['mov_avg_temp']=global_temp['avg_temp'].rolling(30).mean()

#Plotting the global moving average temperature
fig=plt.figure(figsize=(7,4))
ax0=fig.add_axes([0.1,0.3,0.8,0.6])
sns.set_style('whitegrid')
ax0.plot('year','mov_avg_temp',color='g',data=global_temp,label="Global Moving Avg Temp")
ax0.set_ylabel('Global Temperature in ºC',color='g')
```

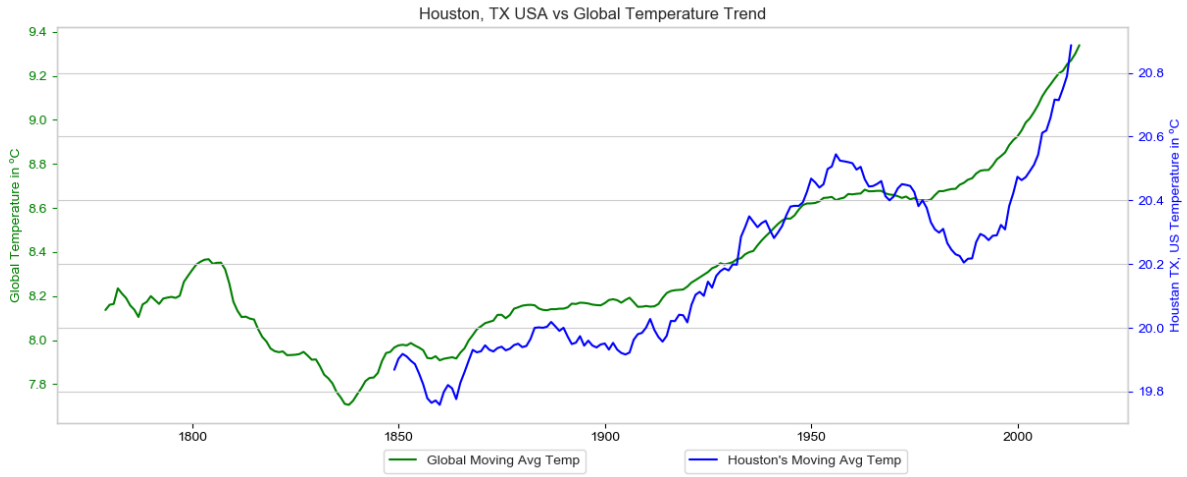
```
ax0.tick_params('y',colors='g')

#Plotting Houston's moving average temperature
ax1=ax0.twinx()
ax1.plot('year','mov_avg_temp',color='b',data=hou_temp,label="Houston's Moving Avg Temp")
ax1.set_xlabel('Year')
ax1.set_ylabel('Houstan TX, US Temperature in ºC',color='b')
ax1.tick_params('y',colors='b')
ax1.set_title('Houston vs Global Temperature Trend')

#setting up legends at the bottom
ax0.legend(loc='best',bbox_to_anchor=(0.5,-0.05))
ax1.legend(loc='best',bbox_to_anchor=(0.8,-0.05))

plt.show()
```

Observations:



The above chart shows the 30 years moving average temperature trends of Houston, and the world. Based on the chart above the following observations can be made about the temperature trends.

Global Temperature:

- The lowest global moving average temperature was recorded as 7.7 ºC in 1837.
- The highest global moving average temperature was recorded as 9.34 ºC in 2015.
- The global avg. temperature saw a steep decrease between 1805 and 1838.
- Since 1839 to 1850, there is a gradual increase in the avg. temperature.
- Between 1875 and 1910, the global avg. temperature is almost steady.
- Since 1911, the avg. temperature have raised steadily.
- Since 1978, the global avg. temperature have raised significantly (approximately by 0.7 ºC).
- The avg. temperature of Houston is around 20 ºC which is 12 ºC above the avg. global temperature.

Houston, US Temperature:

- The avg. temperature of Houston, TX USA is around 12 ºC above the global avg. temperature.
- The lowest moving avg. temperature recorded in Houston was 19.76 ºC in 1860 and 1858.
- The highest moving avg. temperature recorded in Houston was 20.88 ºC in 2013.
- Between 1864 and 1915, the rise in avg. temperature is very small.
- Between 1916 and 1955, there is a significant rise in the avg. temperature (~ 0.6 ºC).
- Unlike, global temperature there is a brief drop in the avg. temperature between 1956 and 1987.
- Since, 1988 the avg. temperature of Houston is up significantly (~ 0.7 ºC) which is similar to the global avg. temperature trend.

Conclusion:

- The overall weather trend of the avg. global temperature and that of Houston USA, suggest that the there is a gradual rise in the temperature.
- There is some drop in Houston's avg. temperature between 1956 and 1987, but overall, its trend is similar to the global temperature trend.
- Houston as well as the world has seen some significant temperature changes in recent years, suggesting that the temperature around the world is rising faster than previous periods.
- The given data suggest that there may be an association between Houston's avg. temperature and global avg. temperature.