explore_weather_trends

August 15, 2018

1 Explore Weather Trends

In [10]:
```
# import libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import warnings
import seaborn as sns
sns.set()
warnings.filterwarnings('ignore')
%matplotlib inline
plt.rcParams['figure.figsize'] = [16, 10]
```

In [11]:
```
# read dataset
tokyo_df = pd.read_csv('dataset/results_tokyo.csv')
global_df = pd.read_csv('dataset/results_global.csv')
```

In [12]:
```
tokyo_df.head()
```

Out[12]:

	year	city	country	avg_temp
0	1845	Tokyo	Japan	11.95
1	1846	Tokyo	Japan	12.40
2	1847	Tokyo	Japan	12.21
3	1848	Tokyo	Japan	12.14
4	1849	Tokyo	Japan	12.14

In [13]:
```
tokyo_df.describe()
```

Out[13]:

	year	avg_temp
count	169.000000	169.000000
mean	1929.000000	12.565740
std	48.930222	0.649692
min	1845.000000	11.180000
25%	1887.000000	12.140000
50%	1929.000000	12.450000
75%	1971.000000	12.920000
max	2013.000000	16.120000

```
In [14]: global_df.describe()
```

Out[14]:

	year	avg_temp
count	266.000000	266.000000
mean	1882.500000	8.369474
std	76.931788	0.584747
min	1750.000000	5.780000
25%	1816.250000	8.082500
50%	1882.500000	8.375000
75%	1948.750000	8.707500
max	2015.000000	9.830000

```
In [15]: global_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 266 entries, 0 to 265
Data columns (total 2 columns):
year        266 non-null int64
avg_temp    266 non-null float64
dtypes: float64(1), int64(1)
memory usage: 4.2 KB
```

```
In [16]: # calculate moving average
         window_size = 10
         tokyo_df['mva_temp'] = tokyo_df['avg_temp'].rolling(window=window_size).mean()
         global_df['mva_temp'] = global_df['avg_temp'].rolling(window=window_size).mean()
```

```
In [17]: tokyo_df.head(30)
```

Out[17]:

	year	city	country	avg_temp	mva_temp
0	1845	Tokyo	Japan	11.95	NaN
1	1846	Tokyo	Japan	12.40	NaN
2	1847	Tokyo	Japan	12.21	NaN
3	1848	Tokyo	Japan	12.14	NaN
4	1849	Tokyo	Japan	12.14	NaN
5	1850	Tokyo	Japan	11.71	NaN
6	1851	Tokyo	Japan	11.76	NaN
7	1852	Tokyo	Japan	11.73	NaN
8	1853	Tokyo	Japan	11.86	NaN
9	1854	Tokyo	Japan	12.24	12.014
10	1855	Tokyo	Japan	12.56	12.075
11	1856	Tokyo	Japan	12.06	12.041
12	1857	Tokyo	Japan	11.94	12.014
13	1858	Tokyo	Japan	12.23	12.023
14	1859	Tokyo	Japan	12.15	12.024
15	1860	Tokyo	Japan	11.72	12.025
16	1861	Tokyo	Japan	11.79	12.028
17	1862	Tokyo	Japan	11.73	12.028

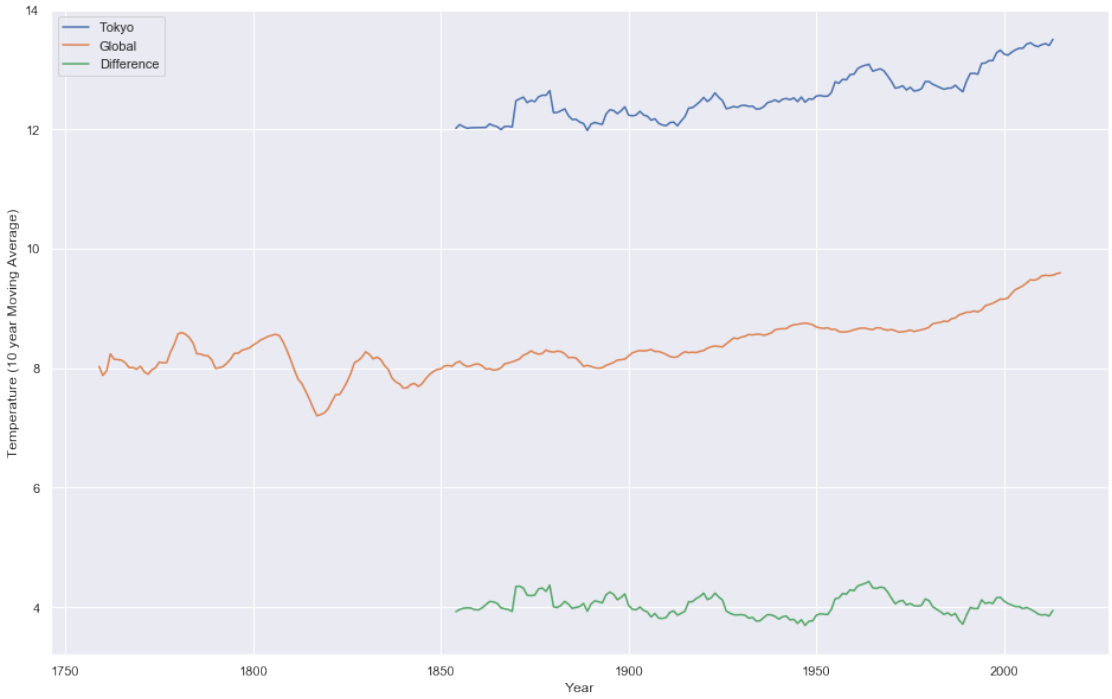
```
18  1863  Tokyo   Japan     12.45    12.087
19  1864  Tokyo   Japan     11.95    12.058
20  1865  Tokyo   Japan     12.39    12.041
21  1866  Tokyo   Japan     11.58    11.993
22  1867  Tokyo   Japan     12.46    12.045
23  1868  Tokyo   Japan     12.25    12.047
24  1869  Tokyo   Japan     12.03    12.035
25  1870  Tokyo   Japan     16.12    12.475
26  1871  Tokyo   Japan     12.12    12.508
27  1872  Tokyo   Japan     12.00    12.535
28  1873  Tokyo   Japan     11.53    12.443
29  1874  Tokyo   Japan     12.33    12.481
```

2 Plot

In [18]:
```
# plot the results
tokyo_year = tokyo_df.year.values[window_size - 2:]
tokyo_temp = tokyo_df.mva_temp.values[window_size - 2:]
global_year = global_df.year.values[window_size - 2:]
global_temp = global_df.mva_temp.values[window_size - 2:]

# calculate the difference
tokyo_year_min = np.min(tokyo_year)
tokyo_year_max = np.max(tokyo_year)
idx = np.where((global_year >= tokyo_year_min) & (global_year <= tokyo_year_max))
diff = tokyo_temp - global_temp[idx]

plt.plot(tokyo_year, tokyo_temp, label='Tokyo')
plt.plot(global_year, global_temp, label='Global')
plt.plot(tokyo_year, diff, label='Difference')
plt.xlabel('Year')
plt.ylabel('Temperature (10 year Moving Average)')
plt.legend()
plt.show()
```



3 Observations

Is your city hotter or cooler on average compared to the global average? My city (Tokyo) is hotter than the global average.

Has the difference been consistent over time? The difference (green line) seems consistent over time.

What does the overall trend look like? The overall trends are similar.

Is the world getting hotter or cooler? Yes, it is. Tokyo is also getting hotter.

4 Outline

What tools did you use for each step? (Python, SQL, Excel, etc)

- SQL to extract data
- Pandas to calculate the moving average
- Matplotlib to plot the results

How did you calculate the moving average? I used Pandas' function.

What were your key considerations when deciding how to visualize the trends? I plot the results so that it's easy to compare the differences and trends.