Data Analyst Nanodegree
Project 1 World Temperature Analysis

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Exploring Weather Trends

Assignment:

Extract and analyze local and global temperature data and compare the temperature trends where you live to overall global temperature trends. Visualize the comparisons.

Procedure:

1. Query three tables in a database and export all values to a .csv files that can be used for further data analysis by other analytic tools.

   Data Files

File/Table	Fields	SQL Query
city_data.csv	year, city, country, avg_temp	Select * From city_data Where city = 'Miami';
city_list.csv	city, country	Select * From city_list;
global_data.csv	year, avg_temp	Select * From global_data;

2. An additional output file, containing only records where there is a temperature for the home city (Miami, United States) was created for analysis.

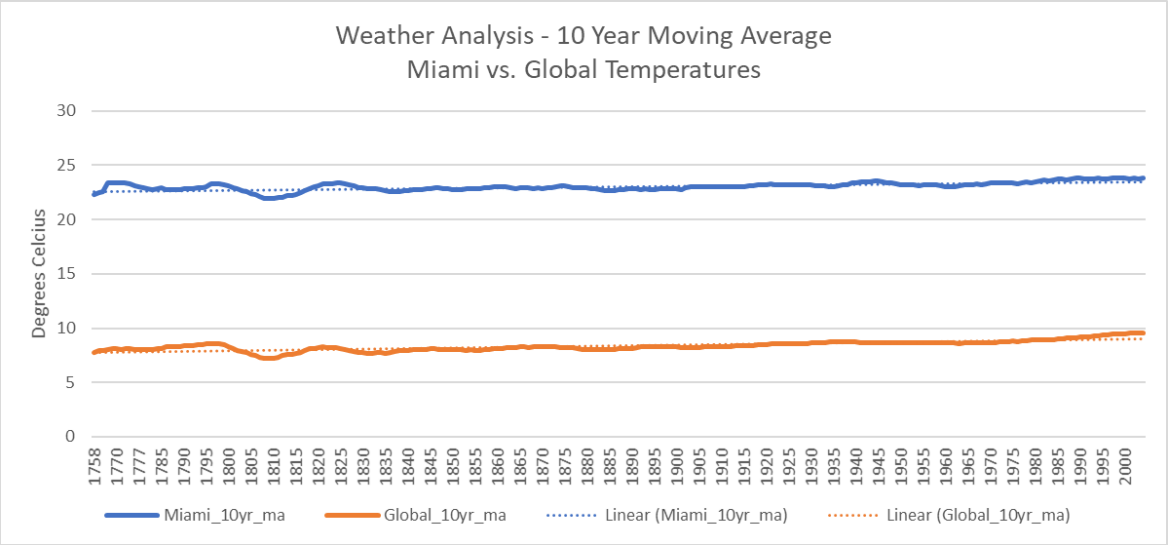
   Data Extract: SQL Query

```
Select c.year,c.avg_temp as avg_miami_temp, g.avg_temp as avg_world_temp
From global_data g
Join city_data c
On c.year = g.year
Where c.city = 'Miami' and c.avg_temp > 0;
```

Data Analysis Process:

Steps

1. Graph the moving averages for Miami and Global temperatures. The five-year moving average showed more variation when plotted compared to the ten year and fifteen year moving averages. The ten-year moving average was selected for comparisons



2. Calculated Summary Descriptive Statistics for the average Miami and average Global temperatures

avg_miami_temp	
Mean	23.04069672
Standard Error	0.049183816
Median	23.06
Mode	23.36
Standard Deviation	0.768275771
Sample Variance	0.590247661
Kurtosis	45.52048212
Skewness	-4.578974748
Range	9.38
Minimum	15.14
Maximum	24.52
Sum	5621.93
Count	244
Confidence Level(95.0%)	0.096881022

avg_world_temp	
Mean	8.3575
Standard Error	0.03595
Median	8.35
Mode	7.98
Standard Deviation	0.56154
Sample Variance	0.31533
Kurtosis	0.5807
Skewness	-0.134
Range	2.99
Minimum	6.74
Maximum	9.73
Sum	2039.24
Count	244
Confidence Level(95.0%)	0.070811447

3. Performed a **correlation analysis** between average Miami temperatures and Global temperatures

   Correlation between the average Miami and Global Temperatures (Celsius)

	avg_miami_temp	*avg_world_temp*
avg_miami_temp	1	
avg_world_temp	0.578736654	1

4. Computed the five, ten, and fifteen year moving averages for both Miami and Global temperatures for graphing and analysis. Calculating the correlation on the moving averages resulted in the following

	Miami_5yr_ma	*Global_5yr_ma*
Miami_5yr_ma	1	
Global_5yr_ma	0.806191173	1

	Miami_10yr_ma	*Global_10yr_ma*
Miami_10yr_ma	1	
Global_10yr_ma	0.880630408	1

Miami_15yr_ma	1	
Global_15yr_ma	0.918497636	1

5. Computed the Analysis of Variance (ANOVA) for average Miami temperatures and the Global temperatures for analysis.

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
avg_miami_temp	244	5621.93	23.04069672	0.590247661
avg_world_temp	244	2039.24	8.357540984	0.315328908

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	26302.59761	1	26302.59761	58090.27868	0	3.860664
Within Groups	220.0551061	486	0.452788284			
Total	26522.65272	487				

Results and Observations:

1. The average temperature in Miami is significantly warmer that the average global temperature.

   H_0: There are no differences between the average temperature in Miami compared to global temperature.
   H_1: There average temperature in Miami is different from the average global temperature

   There is small p value, so the null hypothesis is rejected.
2. The average temperature differences have persisted over time.
3. Although the average temperature in Miami is significantly warmer than the average global temperature, the trend has been towards an increase in the average temperature for Miami and global temperatures. Observing the moving averages, there seems to be a correlation in the trends of the average temperature in Miami and the average global temperatures.
4. The average global temperate has been increasing over the last few hundred years.