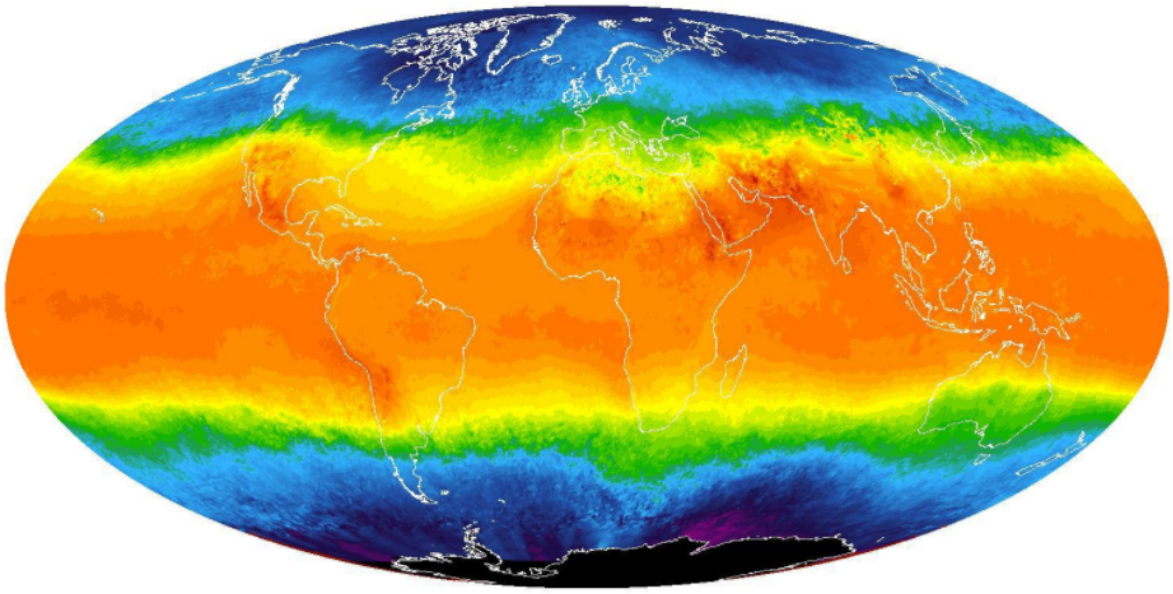
DATA ANALYST NANODEGREE



Case Study: Explore Weather Trends

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1. Overview

This project is to explore weather trends in relation to local average temperatures of different cities around the world, namely Riyadh, relative to yearly global average figures between 1849 and 2013.

2. Goals

1. Extract the data using SQL commands.
2. Download and open the .csv file and convert to a convenience extension of an analytical tool, e.g. .xlsm using MS Excel.
3. Analyze the data and demonstrate the results with comprehended visuals, e.g. plots.
4. Include four observations accurately.

3. Procedure

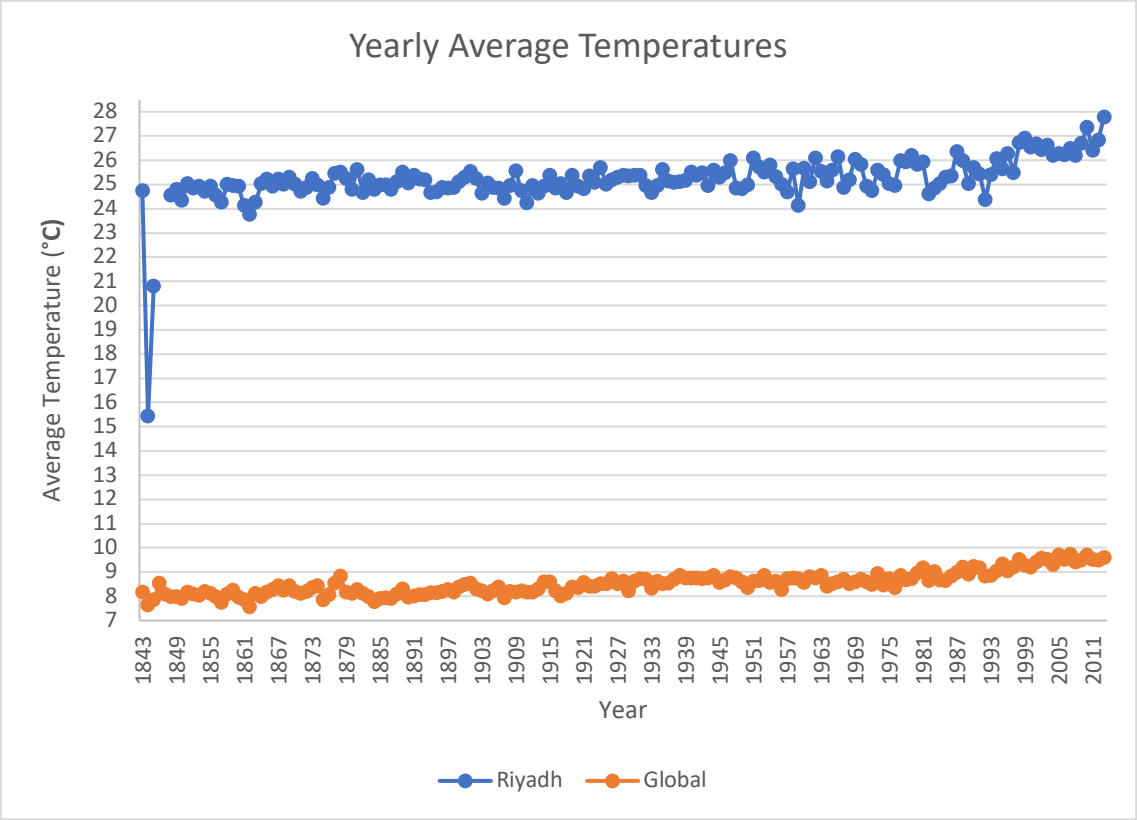
1. Extract the data from udacity.com using the following SQL commands

```sql
SELECT cd.city,cd.country,cd.year,cd.avg_temp cat, gd.avg_temp gat
FROM global_data gd
JOIN city_data cd
ON gd.year = cd.year
WHERE city like 'Riyadh%'
```

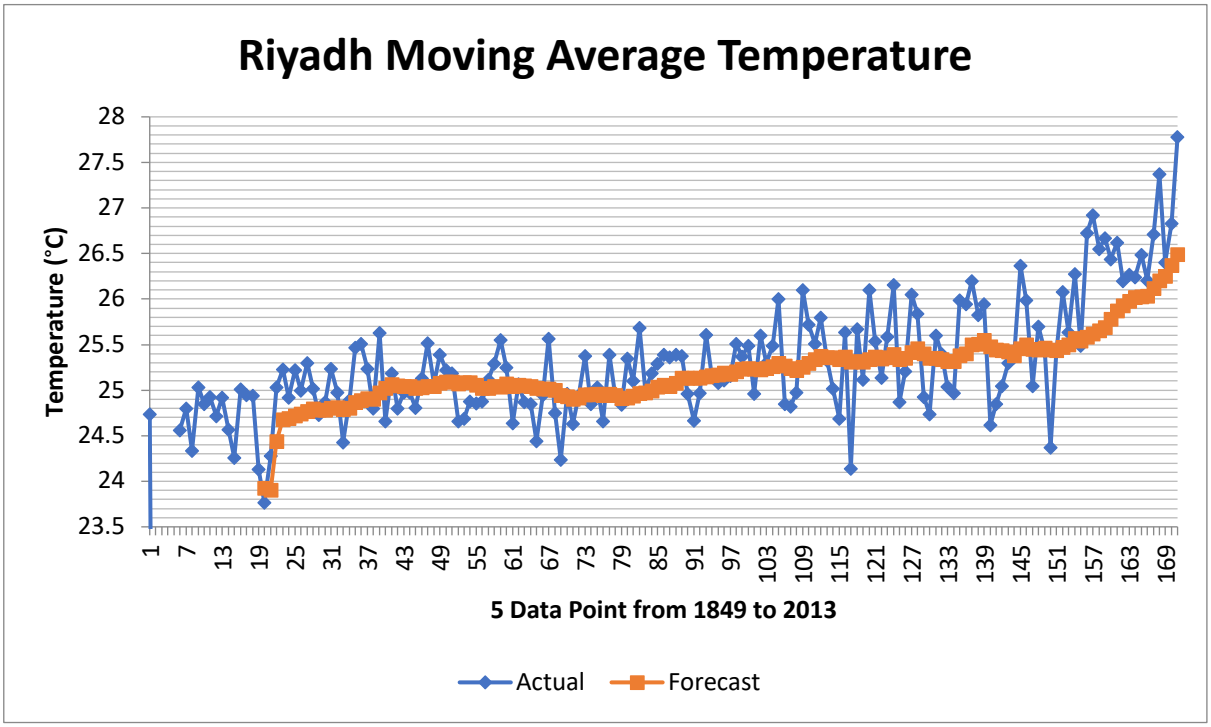
2. Convert the file to .xlsm format to work with MS Excel.
3. Plot both Y-variables vs. year.
4. Plot the moving averages of both Y-variables using 20 years interval.
5. Analysis and make at least four observations.

4. Data Visualization and Analysis

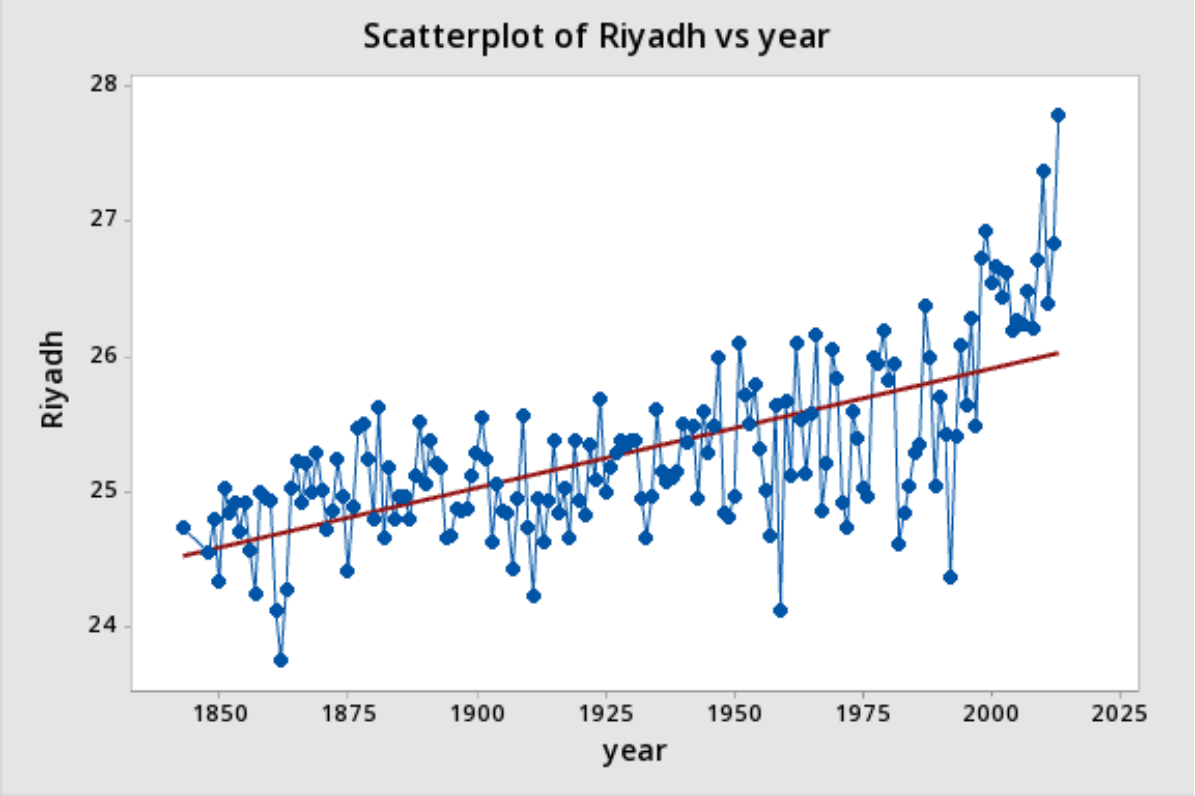
First of all, we plot both local and global yearly average temperature trends in the same graph shown below to see that the local yearly average temperature over the analyzed period in Riyadh city is around 25.2°C while the global figure is about 8.54°C.



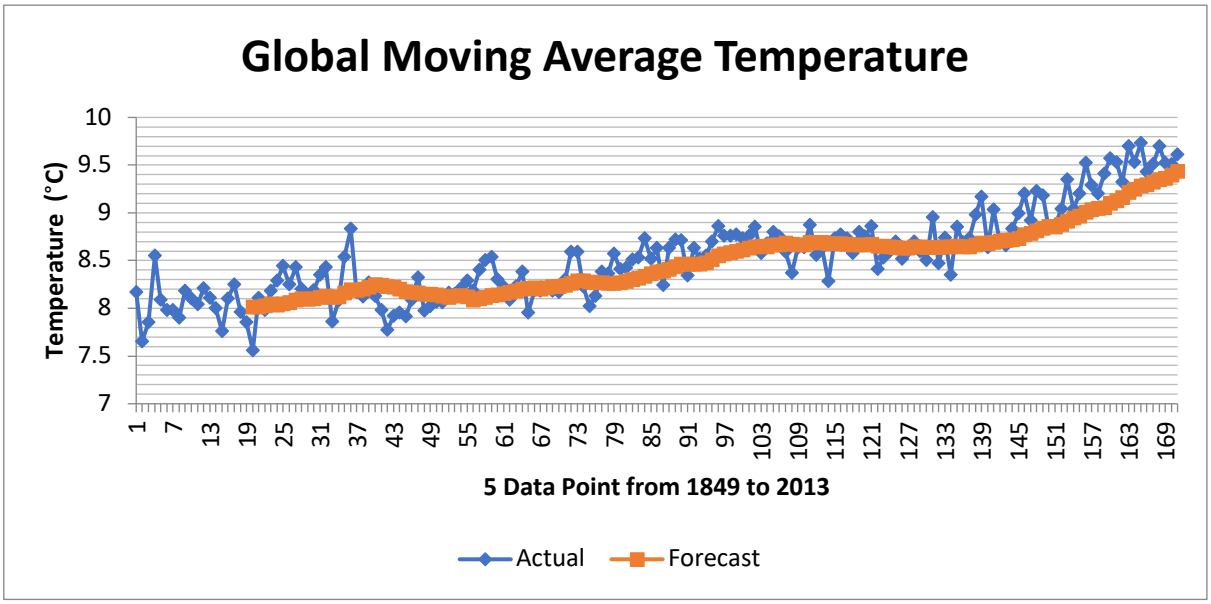
Next, we individually analyze both trends using the moving average with 20 years internal value to smooth out the year-to-year variations. We see then that this value (which starts after the 20th year) is moving from 23.9°C to 26.5°C with a delta of +2.6°C.



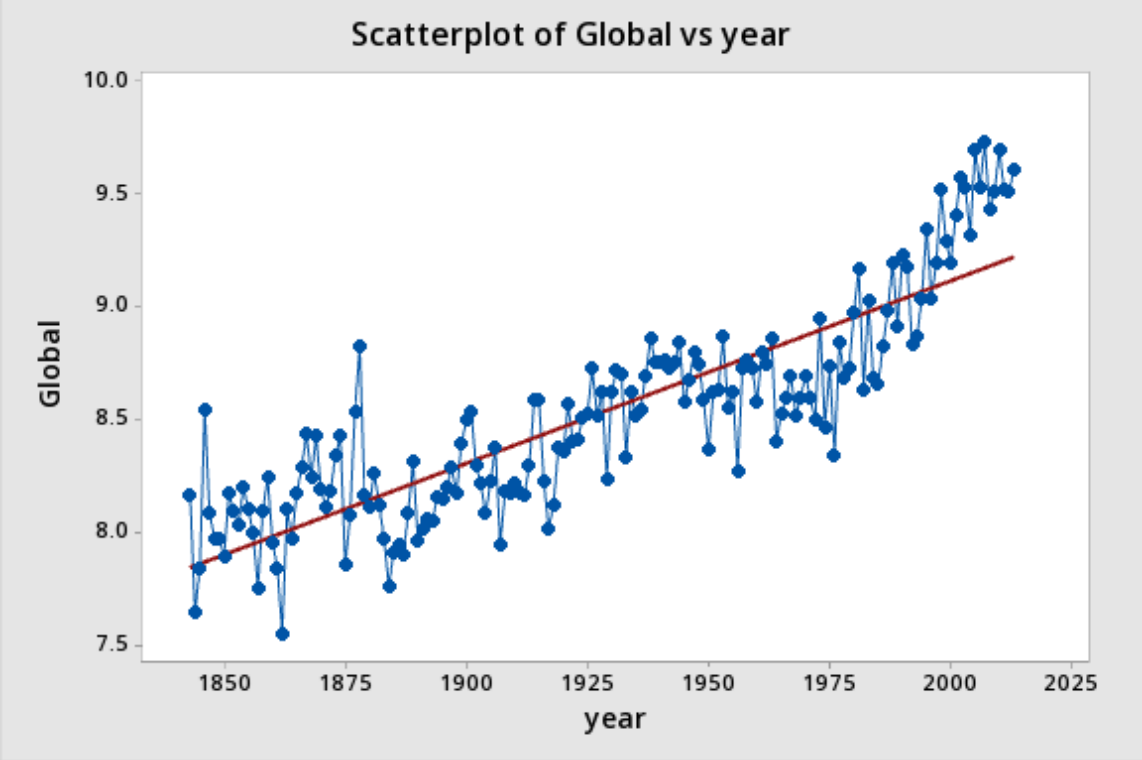
Another scatterplot using Minitab also clearly shows an increasing moving average in Riyadh city. Notice that here I removed two outliers which should be subject to more investigation as it is also followed by two missing readings!



While the same analysis for the global trends shows a moving average from 8.0°C to 9.4°C with a delta of +1.4°C.



Here in Minitab scatterplot, the moving average of global is also visualized.



5. Observations

1. The global annual average temperature had increase over a period of 164 years.
2. The global delta was +1.4°C while the local value was +2.6°C indicating different changing individual local climate changes.
3. The correlation between global and local average temperature trends with time were 0.86 and 0.54 respectively indicating a stronger positive correlation for the global trends against a moderate one for the local value.
4. Below descriptive statistics were extracted using Minitab tool. It is observed that the dispersion in Riyadh is more than double compared to global data.

Variable	*N*	*N**	*Mean*	*StDev*	*Minimum*	*Median*	*Maximum*
Riyadh	169	2	25.214	1.047	15.450	25.150	27.780
Global	171	0	8.5368	0.4645	7.5600	8.5200	9.7300

6. Conclusion

The global and local trends of yearly average temperatures data were extracted with SQL commands, exported to and analyzed using MS Excel and Minitab Tool. Visual representations of analyzed data were demonstrated with defined axis's and legends indicating two smoothed increasing moving averages with different variations and year-to-year variances noticed. It is recommended to perform more analysis using the proper statistical analytics tools.