

# Explore Weather Trends

Udacity Data Analyst Nanodegree project #1

Done by: Naif Alsofyani

## 1. Data Extraction

First, I need to find the closest city to where I live. To do that I wrote the following query since I live in Saudi Arabia:

The screenshot shows a web-based SQL query editor. The 'Input' section on the left lists a schema with tables: city\_data, city\_list, and global\_data. The main query area contains two lines of SQL: `1. SELECT * FROM city_list` and `2. Where country = 'Saudi Arabia'`. A green 'Success!' message and a blue 'EVALUATE' button are visible. The 'Output' section shows '2 results' and a 'Download CSV' link. Below this, a table displays the results:

| city   | country      |
|--------|--------------|
| Mecca  | Saudi Arabia |
| Riyadh | Saudi Arabia |

The query showed two cities, Mecca and Riyadh. I am currently living in Riyadh hence I will choose this city to be compared with the global data.

## 1.1 Extracting Riyadh data

I wrote the following query to retrieve Riyadh city data:

The screenshot shows a data query interface. On the left, under 'Input', there is a 'SCHEMA' dropdown and a list of tables: 'city\_data', 'city\_list', and 'global\_data'. The 'city\_data' table is selected. On the right, the query is written as:   
1 SELECT \* FROM city\_data  
2 Where city = 'Riyadh'  
Below the query, there is a green 'Success!' message and a blue 'EVALUATE' button. The 'Output' section shows '171 results' and a 'Download CSV' link. The output table has four columns: 'year', 'city', 'country', and 'avg\_temp'. The data rows show years from 1843 to 1850, all for 'Riyadh' in 'Saudi Arabia', with average temperatures ranging from 15.45 to 24.80.

| year | city   | country      | avg_temp |
|------|--------|--------------|----------|
| 1843 | Riyadh | Saudi Arabia | 24.74    |
| 1844 | Riyadh | Saudi Arabia | 15.45    |
| 1845 | Riyadh | Saudi Arabia | 20.82    |
| 1846 | Riyadh | Saudi Arabia |          |
| 1847 | Riyadh | Saudi Arabia |          |
| 1848 | Riyadh | Saudi Arabia | 24.56    |
| 1849 | Riyadh | Saudi Arabia | 24.80    |
| 1850 | Riyadh | Saudi Arabia | 24.34    |

Figure 1 Extracting Local Data.

I retrieved all columns for Riyadh city just in case I ever want to use it.

## 1.2 Extracting Global data

I wrote the following query to retrieve global data:

The screenshot shows a data query interface. On the left, under 'Input', there is a 'SCHEMA' dropdown and a list of tables: 'city\_data', 'city\_list', and 'global\_data'. The 'global\_data' table is selected. On the right, the query is written as:   
1 SELECT \* FROM global\_data  
Below the query, there is a green 'Success!' message and a blue 'EVALUATE' button. The 'Output' section shows '266 results' and a 'Download CSV' link. The output table has two columns: 'year' and 'avg\_temp'. The data rows show years from 1750 to 1757, with average temperatures ranging from 5.78 to 9.02.

| year | avg_temp |
|------|----------|
| 1750 | 8.72     |
| 1751 | 7.98     |
| 1752 | 5.78     |
| 1753 | 8.39     |
| 1754 | 8.47     |
| 1755 | 8.36     |
| 1756 | 8.85     |
| 1757 | 9.02     |

Figure 2 Extracting Global Data.

## 2. Preparing the data

Let us have a look at the data we retrieved:

### Riyadh Data

| year | city   | country      | avg_temp |
|------|--------|--------------|----------|
| 1843 | Riyadh | Saudi Arabia | 24.74    |

Figure 3 First record in Riyadh Data

### Global Data

| year | avg_temp |
|------|----------|
| 1750 | 8.72     |

Figure 4 First record in Global Data.

As shown above, local data starts from **1843** and global data starts from **1750**. It is better to use common years (**from 1843 to 2013**) to have more accurate and useful dataset comparison. Furthermore, while retrieving Riyadh (local data) the query returned two null values that must be excluded. Then I calculated the moving average using excel on 7-years basis for both global and local data to use it for line plot.

| year | city   | country      | avg_temp |
|------|--------|--------------|----------|
| 1843 | Riyadh | Saudi Arabia | 24.74    |
| 1844 | Riyadh | Saudi Arabia | 15.45    |
| 1845 | Riyadh | Saudi Arabia | 20.82    |
| 1846 | Riyadh | Saudi Arabia |          |
| 1847 | Riyadh | Saudi Arabia |          |

Figure 5 Null values in Riyadh avg\_temp.

| A    | B      | C            | D        | E                               |
|------|--------|--------------|----------|---------------------------------|
| year | city   | country      | avg_temp | Riyadh (7 years moving average) |
| 1843 | Riyadh | Saudi Arabia | 24.74    |                                 |
| 1844 | Riyadh | Saudi Arabia | 15.45    |                                 |
| 1845 | Riyadh | Saudi Arabia | 20.82    |                                 |
| 1848 | Riyadh | Saudi Arabia | 24.56    |                                 |
| 1849 | Riyadh | Saudi Arabia | 24.8     |                                 |
| 1850 | Riyadh | Saudi Arabia | 24.34    |                                 |
| 1851 | Riyadh | Saudi Arabia | 25.03    | 22.82                           |

Figure 6 7-Years Moving Average for Riyadh city.

### 3. Data visualization

After preparing the data and calculating the moving average now the dataset is ready for plotting using line graph. The graph below shows the moving average temperature on y-axis and the year range on x-axis and using these inputs to generate this graph.

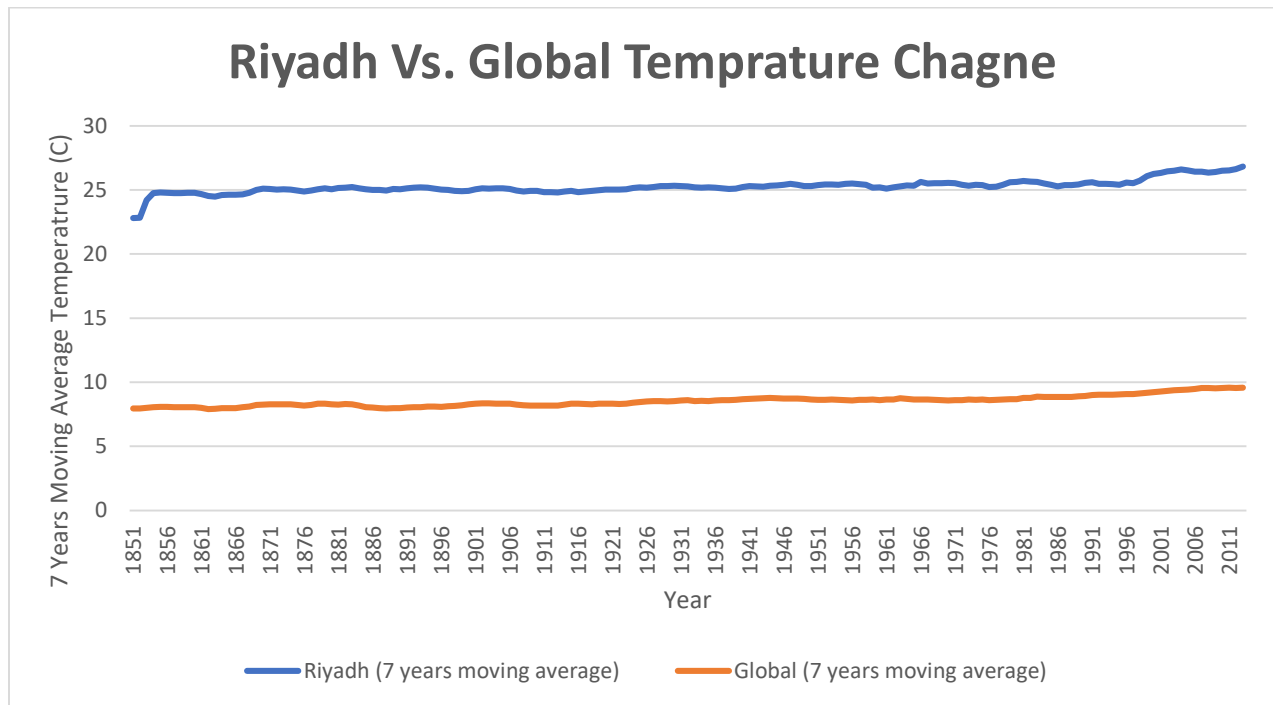


Figure 7 Riyadh Vs. Global Temperature Change.

#### 4. Observations

- 1) Riyadh weather is much warmer than the global average in the past 170 years (from 1843 to 2013) and expected to stay that way.
- 2) Both Riyadh and global average temperature can be noticed that it is increasing after years passing due to global warming as we know.
- 3) The dataset shows that Riyadh's moving temperature average is significantly increasing more than the global temperature does over the entire years span (from 1851 - 2013).
- 4) The dataset shows an abnormal temperature increase by °2 in Riyadh between the year 1851 – 1854 that did not happen again in the entire years span.

| K    | L                               |
|------|---------------------------------|
| year | Global (7 years moving average) |
| 1851 | 7.958571429                     |

Figure 8 First 7-Year Global Moving Average.

|      |      |             |
|------|------|-------------|
| 2013 | 9.61 | 9.572857143 |
|------|------|-------------|

Figure 9 Last 7-Year Global Moving Average.

| M    | N                               |
|------|---------------------------------|
| year | Riyadh (7 years moving average) |
| 1851 | 22.82                           |

Figure 10 First 7-Year Moving Average in Riyadh.

|      |        |              |       |             |
|------|--------|--------------|-------|-------------|
| 2013 | Riyadh | Saudi Arabia | 27.78 | 26.82714286 |
|------|--------|--------------|-------|-------------|

Figure 11 Last 7-Year Moving Average in Riyadh.

| A    | B      | C            | D        | E                               |
|------|--------|--------------|----------|---------------------------------|
| year | city   | country      | avg_temp | Riyadh (7 years moving average) |
| 1843 | Riyadh | Saudi Arabia | 24.74    |                                 |
| 1844 | Riyadh | Saudi Arabia | 15.45    |                                 |
| 1845 | Riyadh | Saudi Arabia | 20.82    |                                 |
| 1848 | Riyadh | Saudi Arabia | 24.56    |                                 |
| 1849 | Riyadh | Saudi Arabia | 24.8     |                                 |
| 1850 | Riyadh | Saudi Arabia | 24.34    |                                 |
| 1851 | Riyadh | Saudi Arabia | 25.03    | 22.82                           |
| 1852 | Riyadh | Saudi Arabia | 24.85    | 22.83571429                     |
| 1853 | Riyadh | Saudi Arabia | 24.93    | 24.19                           |
| 1854 | Riyadh | Saudi Arabia | 24.72    | 24.74714286                     |

Figure 12 Abnormal Temperature Increase in Riyadh.