UDACITY

DATA ANALYST NANODEGREE

PROJECT 1: EXPLORE WEATHER TRENDS

By
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OBJECTIVE:

To analyze and compare the temperature trends from my favourite cities from around the world to change in overall global temperature trend.

UNDERSTANDING AND EXTRACTION OF DATA:

Data needed to meet the objective are extracted using the following SQL queries from the given temperatures database. and downloaded `city_data.csv` and `global_data.csv` files to local drive.

STEP 1: Checked the cities in countries like India, Iran and Russia for further data analysis.

```sql
SELECT *
FROM city_list
WHERE country IN ('India', 'Iran', 'Russia')
ORDER BY country;

```

STEP 2: Extracted data from years 1808 to 2013 to maintain consistency with the range of year in the city data for the selected cities Hyderabad,Tabriz and Moscow. Downloaded the result as city_data.csv file.

```sql
SELECT * FROM city_data
WHERE (country = 'Iran' AND city = 'Tabriz'
       AND year BETWEEN 1808 AND 2013)
   OR (country = 'India' AND city = 'Hyderabad'
       AND year BETWEEN 1808 AND 2013)
   OR (country = 'Russia' AND city = 'Moscow'
       AND year BETWEEN 1808 AND 2013);

```

STEP 3: Extracted Global data from years 1808 to 2013 to match with the year range of the city data for the selected cities. Downloaded the result as global_data.csv file.

```sql
SELECT year, avg_temp AS Global_Avg_Temp
FROM global_data
WHERE year BETWEEN 1808 AND 2013;

```

DATA ANALYSIS:

I used Google sheets for data analysis.

Migrated Global data from `global_data.csv` and City data from `city_data.csv` to `Global Vs Local Weather Trends` on spreadsheet file on Google Drive for calculating moving averages and creating line charts.

1. Calculating Moving Averages:

I considered calculating 10 year moving average to observe long term trends between local and global temperatures and for a smooth line chart.

Formula used to calculate moving average as shown in the **TABLE A**

CITY	FORMULA
HYDERABAD	=AVERAGE(D2:D11)
MOSCOW	=AVERAGE(I2:I11)
TABRIZ	=AVERAGE(N2:N11)
GLOBAL	=AVERAGE(H2:H11)

TABLE A

Global Vs Local Weather Trends

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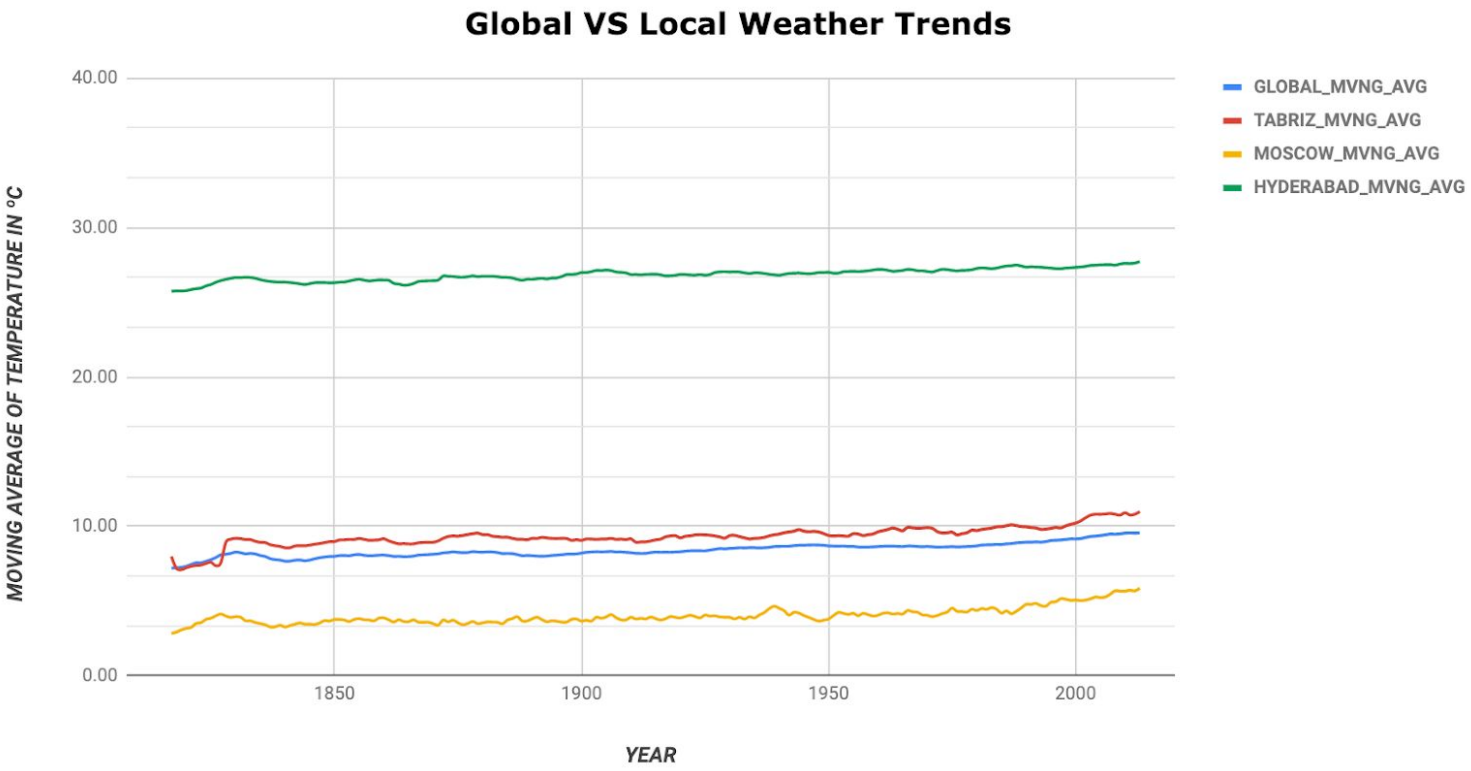
=AVERAGE(D2:D11)

YEAR	CITY	COUNTRY	AVG_TEMP	HYDERABAD_MVNG_AVG	CITY	COUNTRY	AVG_TEMP	MOSCOW_MVNG_AVG	CITY	COUNTRY	AVG_TEMP	TABRIZ_MVNG_AVG	YEAR	GLOBAL_AVG_TEMP	GLOBAL_MVNG_AVG
1808	Hyderabad	India			Moscow	Russia	3.21		Tabriz	Iran	3.29		1808	7.63	
1809	Hyderabad	India			Moscow	Russia	1.9		Tabriz	Iran	7.81		1809	7.08	
1810	Hyderabad	India			Moscow	Russia	2.09		Tabriz	Iran	7.51		1810	6.92	
1811	Hyderabad	India			Moscow	Russia	3.21		Tabriz	Iran	7.91		1811	6.86	
1812	Hyderabad	India			Moscow	Russia	2.4		Tabriz	Iran	8		1812	7.05	
1813	Hyderabad	India	26.25		Moscow	Russia	3.45		Tabriz	Iran	8.69		1813	7.74	
1814	Hyderabad	India	25.65		Moscow	Russia	2.79		Tabriz	Iran	8.85		1814	7.59	
1815	Hyderabad	India	25.8		Moscow	Russia	2.82		Tabriz	Iran	8.35		1815	7.24	
1816	Hyderabad	India	25.38		Moscow	Russia	3.23		Tabriz	Iran	11.33		1816	6.94	
1817	Hyderabad	India	25.61	25.74	Moscow	Russia	3.17	2.83	Tabriz	Iran	8.09	7.98	1817	6.98	7.20
1818	Hyderabad	India	25.83	25.75	Moscow	Russia	4.11	2.92	Tabriz	Iran	-4.65	7.19	1818	7.83	7.22
1819	Hyderabad	India	25.78	25.76	Moscow	Russia	3.39	3.07	Tabriz	Iran	6.88	7.10	1819	7.37	7.25
1820	Hyderabad	India	25.88	25.77	Moscow	Russia	3.12	3.17	Tabriz	Iran	8.84	7.23	1820	7.62	7.32
1821	Hyderabad	India	26.45	25.85	Moscow	Russia	3.88	3.24	Tabriz	Iran	8.87	7.33	1821	8.09	7.45
1822	Hyderabad	India	26.43	25.91	Moscow	Russia	5.01	3.50	Tabriz	Iran	8.54	7.38	1822	8.19	7.56
1823	Hyderabad	India	26.65	25.95	Moscow	Russia	3.99	3.55	Tabriz	Iran	8.99	7.41	1823	7.72	7.56
1824	Hyderabad	India	27.1	26.09	Moscow	Russia	4.98	3.77	Tabriz	Iran	9.91	7.52	1824	8.55	7.65
1825	Hyderabad	India	26.72	26.18	Moscow	Russia	3.6	3.85	Tabriz	Iran	9.12	7.59	1825	8.39	7.77
1826	Hyderabad	India	26.89	26.33	Moscow	Russia	4.84	4.01	Tabriz	Iran	9.02	7.36	1826	8.36	7.91
1827	Hyderabad	India	26.73	26.45	Moscow	Russia	4.37	4.13	Tabriz	Iran	10	7.55	1827	8.81	8.09
1828	Hyderabad	India	26.63	26.53	Moscow	Russia	2.78	4.00	Tabriz	Iran	8.98	8.92	1828	8.17	8.13
1829	Hyderabad	India	26.47	26.60	Moscow	Russia	2.45	3.90	Tabriz	Iran	9.07	9.13	1829	7.94	8.18
1830	Hyderabad	India	26.45	26.65	Moscow	Russia	3.64	3.95	Tabriz	Iran	9.42	9.19	1830	8.52	8.27
1831	Hyderabad	India	26.41	26.65	Moscow	Russia	3.5	3.92	Tabriz	Iran	8.63	9.17	1831	7.64	8.23
1832	Hyderabad	India	26.63	26.67	Moscow	Russia	2.62	3.68	Tabriz	Iran	7.98	9.11	1832	7.45	8.16
1833	Hyderabad	India	26.5	26.65	Moscow	Russia	3.93	3.67	Tabriz	Iran	8.94	9.11	1833	8.01	8.18
1834	Hyderabad	India	26.56	26.60	Moscow	Russia	3.86	3.56	Tabriz	Iran	8.78	8.99	1834	8.15	8.14
1835	Hyderabad	India	25.8	26.51	Moscow	Russia	2.89	3.49	Tabriz	Iran	8.41	8.92	1835	7.39	8.04
1836	Hyderabad	India	26.19	26.44	Moscow	Russia	4.03	3.41	Tabriz	Iran	8.86	8.91	1836	7.7	7.98
1837	Hyderabad	India	26.24	26.39	Moscow	Russia	2.97	3.27	Tabriz	Iran	8.59	8.77	1837	7.38	7.84
1838	Hyderabad	India	26.33	26.36	Moscow	Russia	2.85	3.27	Tabriz	Iran	8.31	8.70	1838	7.51	7.77
1839	Hyderabad	India	26.34	26.35	Moscow	Russia	3.49	3.38	Tabriz	Iran	8.59	8.65	1839	7.63	7.74
1840	Hyderabad	India	26.44	26.34	Moscow	Russia	2.46	3.26	Tabriz	Iran	8.53	8.56	1840	7.8	7.67
1841	Hyderabad	India	26.12	26.32	Moscow	Russia	4.46	3.36	Tabriz	Iran	8.64	8.56	1841	7.69	7.67

2. Creating Line Chart:

Created line chart with Year on the X-axis and Moving averages of temperature in ºC on the Y-axis.



GRAPH 1 - Global VS Local Weather Trends

FINDINGS:

1.

From the **GRAPH 1** and **TABLE B** it clearly shows that the moving average temperature in Hyderabad is significantly higher than the other cities and global moving average temperature over the years.

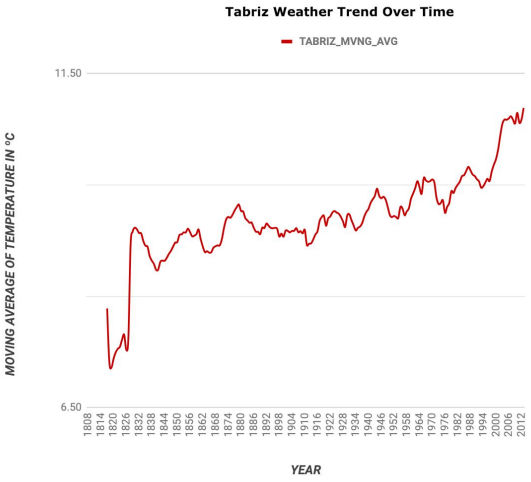
While the moving average temperature in Moscow is below the global moving temperature and Tabriz moving average temperature is almost equal to the global moving average.

CITY	MOVING AVERAGE RANGE
HYDERABAD	25.74ºC - 27.72ºC
MOSCOW	2.83ºC - 5.86ºC
TABRIZ	7.10ºC - 10.99ºC
GLOBAL	7.20ºC - 9.56ºC

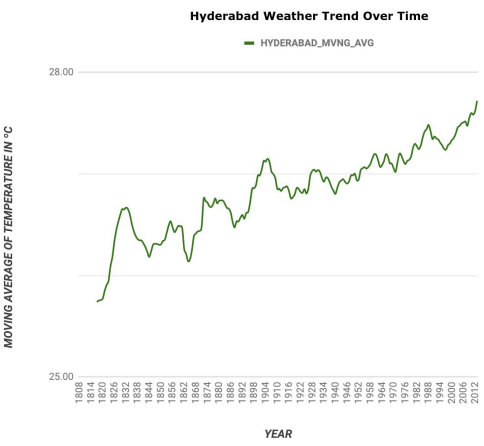
TABLE B

2. The individual graphs shown below from the Graph 2 - Graph 5 explains the change in temperature is similar for the selected local cities and globally. We can observe the fluctuations in the temperatures over the years but there is a gradual increases in overall temperature for the considered time period (1808-2013).

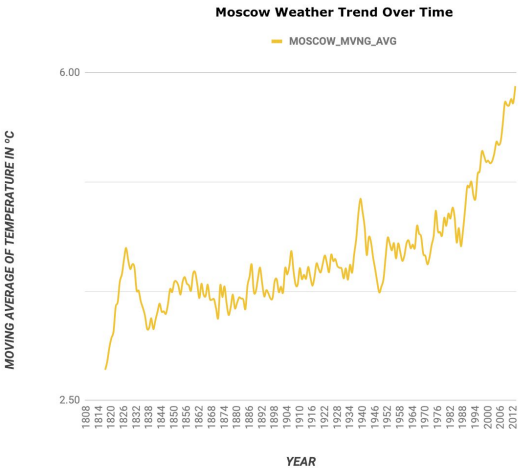
GRAPH 2 - Global Weather Trend



GRAPH 4 - Tabriz Weather Trend



GRAPH 3 - Hyderabad Weather Trend



GRAPH 5 - Moscow Weather Trend

3. From the year 1997, the temperature is steadily increasing globally and locally regardless of the geographical location.
4. We can estimate the local average temperature based on the global average temperature as they are directly proportional.
5. In conclusion, the temperatures have been consistently rising throughout the word and over the years.

REFERENCES:

1. UDACITY LOGO - Registered Trademark of © 2011–2019 Udacity, Inc.
2. Cover Page Image - (https://s3.amazonaws.com/video.udacity-data.com/topher/2018/August/5b635343_1-p-explore-weather-trends2x/1-p-explore-weather-trends2x.jpg)
3. Icons - made by Freepik (http://www.freepik.com/) from www.flaticon.com