Objective: Comparison of global temperature with local city temperature data and analysis of their trends

This project aims to compare the average temperature globally with the temperature of the local area one resides in. This is done using line charts and analyzing them for drawing out trends over the years. Also, we are using moving averages here so as to negate unnecessary noise in the data without the loss of significant information.

Steps to draw out the data

To layout the comparisons, the first step is to extract the data from the given temperatures database. To extract the global temperature data, following simple SQL query was written:

```
9   SELECT *
10  FROM global_data;
```

To extract the local temperature data, I first wrote a query for listing all the cities in my country. After a quick look through I found the city I am currently residing in and then, filtered the data specific to the city.

The two datasets from the above SQL query were downloaded in a csv file. From there, I copy pasted the data in a new excel file. This is where I worked upon the data.

I calculated and subsequently, plotted line plots using a number of duration of moving averages like, 7,10,14 etc. So, I have eventually plotted using 10 year moving average. This choice was based on the smoothening of the plots, without trying to lose any significant information.

Below are the screenshots of the excel file used for calculating moving averages.
(Please note column B is the global average temperature and in column D is its corresponding 10 year Moving average. Similarly are column C and E for local temperature. The formula used for calculating moving average is also indicated.)

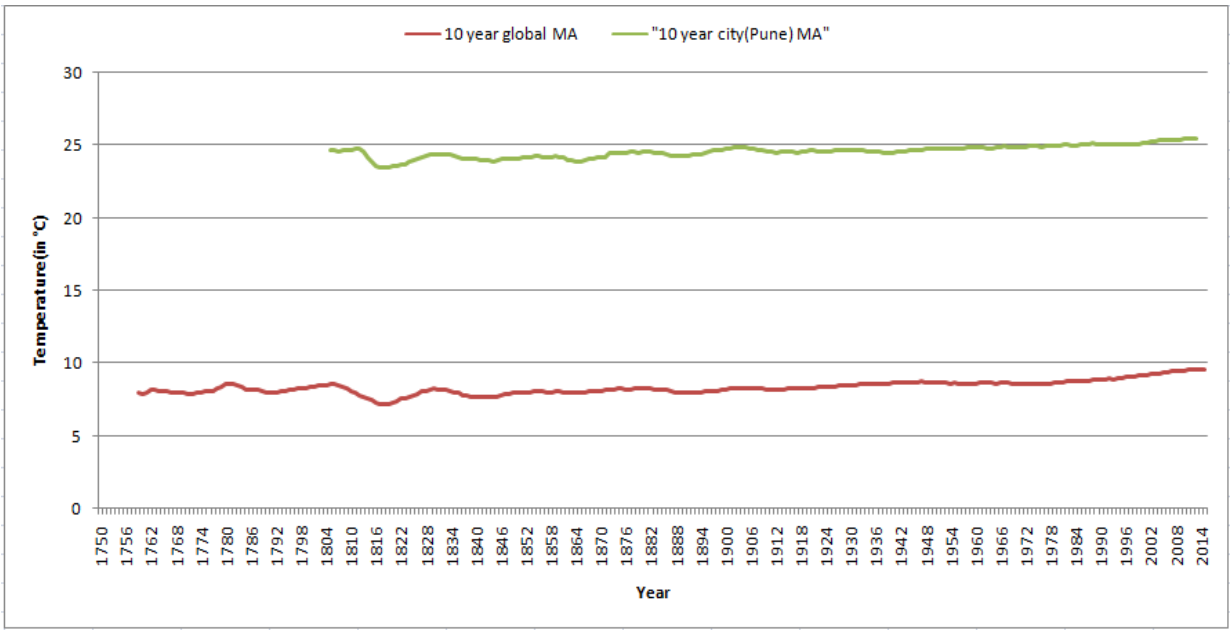
D11 =AVERAGE(B2:B11)

	A	B	C	D	E	F
1	Year	avg_temp_global	avg_temp_local	10_yr_MA_global	10_yr_MA_local	
2	1750	8.72				
3	1751	7.98				
4	1752	5.78				
5	1753	8.39				
6	1754	8.47				
7	1755	8.36				
8	1756	8.85				
9	1757	9.02				
10	1758	6.74				
11	1759	7.99		8.03		
12	1760	7.19		7.877		
13	1761	8.77		7.956		
14	1762	8.61		8.239		
15	1763	7.5		8.15		
16	1764	8.4		8.143		
17	1765	8.25		8.132		
18	1766	8.41		8.088		
19	1767	8.22		8.008		
20	1768	6.78		8.012		
21	1769	7.69		7.982		
22	1770	7.69		8.032		
23	1771	7.85		7.94		
24	1772	8.19		7.898		
25	1773	8.22		7.97		

E57 =AVERAGE(C48:C57)

	A	B	C	D	E
47	1795	8.35		8.248	
48	1796	8.27	24.39	8.249	
49	1797	8.51	25.17	8.297	
50	1798	8.67	24.05	8.319	
51	1799	8.51	24.68	8.337	
52	1800	8.48	24.67	8.387	
53	1801	8.59	23.94	8.423	
54	1802	8.58	25.18	8.472	
55	1803	8.5	24.95	8.499	
56	1804	8.84	25.33	8.53	
57	1805	8.56	24.8	8.551	24.716
58	1806	8.43	24.68	8.567	24.745
59	1807	8.28	24	8.544	24.628
60	1808	7.63		8.44	24.69222222
61	1809	7.08		8.297	24.69375
62	1810	6.92		8.141	24.69714286
63	1811	6.86		7.968	24.82333333
64	1812	7.05		7.815	24.752
65	1813	7.74	24.03	7.739	24.568
66	1814	7.59	23.49	7.614	24.2
67	1815	7.24	23.58	7.482	23.956
68	1816	6.94	23.13	7.333	23.646
69	1817	6.98	23.37	7.203	23.52
70	1818	7.83	23.8	7.223	23.56666667
71	1819	7.37	23.54	7.252	23.56285714

Below is the plot drawn using the above 10 year moving average data.



Key assumptions

The observations noted below are only based on the sample data provided.

Observations

Some of the observations noted from the above plot are as below:

1. The city I reside in i.e. Pune, is much hotter than the average global temperature.
2. In last 100 years, the average global temperature has either remained similar or has been rising. There does not seem to be any kind of a dip. While the local temperature has seen certain dips between 1936 and 1942 but has sharply risen after 1996.
3. Over the past 50 years, we can say that the average global temperature has seen a constant upwards trend. The local temperature seems to be rising particularly from the last 18 years.
4. The world is certainly getting hotter. This seems to be the trend over the last 100 years but after 1990, it seems to have risen steadily.
5. The mean global temperature 8.35^{O}C and the mean local temperature is 24.6^{O}C. But, if we observe, after 1996, the mean global temperature has risen to 25.35^{O}C and that of local is 9.36^{O}C.
6. During the period between 1990 and 1996, the local temperature has first time gone beyond 25^{O}C.