

Exercise 1

Explore Weather Trends

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Summary

This exercise explores and interprets the weather trend in my neighboring city - **San Jose, United States** and the favorite city - **New Delhi, India** and compares it to the Global Temperature trend.

Line graphs are the most appropriate to show the trends in data. The analysis leverages the SQL and Microsoft Excel tools to develop and compare the trends. Also, the study explores 5Yr- Moving Average vs. 10 yr Moving Average for City and Global data.

The procedure I follow is - **iteratively** exploring the data, extracting it, building intuitive graphs, and interpreting the data and summarizing the findings. These **Steps** are detailed

Nearest City - Temperature Trend Exploration

Procedure

First step of the exploration is to understand the data provided in the 3 data sources (tables) -

- **city_list** - This master table contains data about the City name and Country.
- **city_data** - This table references the **city_list** table and has **Year**, and Average Temperature
- **global_data** - This table holds the average global temperature by the year.

Step 1: Exploring the Data

1. Understand the size of data before extracting it.
 - a. select count(*) from <table_name> to see the sizes of data
 - b. e.g: select count(*) from city_list
2. Download the data
 - a. select * from the <table name> to download the data.
 - b. e.g: select * from city_list
3. Understand if San Francisco or San Jose cities exist
 - a. After downloading the data, I opened the csv file in Excel and sorted the city_list by country. Then searched for 'San Jose' or San Francisco. Both these cities exist in the city_list data. And I choose '**San Jose**'

Step 2: Extracting Temperature Data for San Jose City

1. Perform SQL query to extract the temperature data for **San Jose, United States** and join with Global data

```
select cd.city as City, cd.year as Year, cd.avg_temp as CityTemp, gd.avg_temp GlobalTemp
from city_data as cd, global_data as gd
where cd.city='San Jose'
and cd.country = 'United States'
and cd.year = gd.year
```

2. Export the data to Excel
 - a. The data has 165 rows with Year ranging from 1849 to 2013

Step 3: Line graphs

Leveraged the Excel chart functionality to build initial graphs and improve the graphs (See **Fig 2: San Jose Trend Graph**)

1. Improved the line colors and background for the City and Global data.
2. **Axis** - Y-Axis range updated to start from 6 instead of 0.
3. Added **Legend**
4. Added informative **Title**

Step 4: Develop Moving Average (MA)

The temperature data for the City was very jagged compared to the Global data. This hindered in the data analysis. Hence, I tried to smooth the graph by exploring 2 kinds of Moving Averages on the data

1. 5Yr Moving Average (for **5Yr-MA-City** and **5Yr-MA-Global**)
2. 10Yr Moving Average (for **10Yr-MA-City**)

Below is the snippet of data showing the Beginning Year 1849, 5Yr Moving Average and 10Yr Moving Average and Ending Year 2013 from the data. See **Fig: 1 - Data Snippet**

<<Beginning>>

City	Year	City Temp	Global Temp	5yr-MA-City	5Yr-MA-Glo	10Yr-MA City
San Jose	1849	14.12	7.98			
San Jose	1850	13.8	7.9			
San Jose	1851	14.39	8.18			
San Jose	1852	13.81	8.1			
San Jose	1853	14.4	8.04	14.104	8.04	
San Jose	1854	13.98	8.21	14.076	8.086	
San Jose	1855	14.2	8.11	14.156	8.128	
San Jose	1856	14.1	8	14.098	8.092	
San Jose	1857	14.78	7.76	14.292	8.024	
San Jose	1858	14.19	8.1	14.25	8.036	14.177

.....

<<Ending>>

San Jose	2011	14.5	9.52	14.836	9.578	15.017
San Jose	2012	15.05	9.51	14.858	9.534	15.022
San Jose	2013	16.23	9.61	15.094	9.57	15.102

Fig: 1 - Data Snippet

Next, I overlaid the Moving Average (MA) graph over the temperature line graph.

The 5Yr MA is shown by the **Green** line and 10Yr MA is shown by the **Red** line.

For the City data, the MA graph lines shows the trend.

- Also, the **10Yr-MA-City** is much smoother than **5Yr-MA-City**

Since the global data graph did not show great variations (sharp edges) **the 5Yr-MA-Global was good enough to show the trend.** See **Fig 2: San Jose Trend Graph**

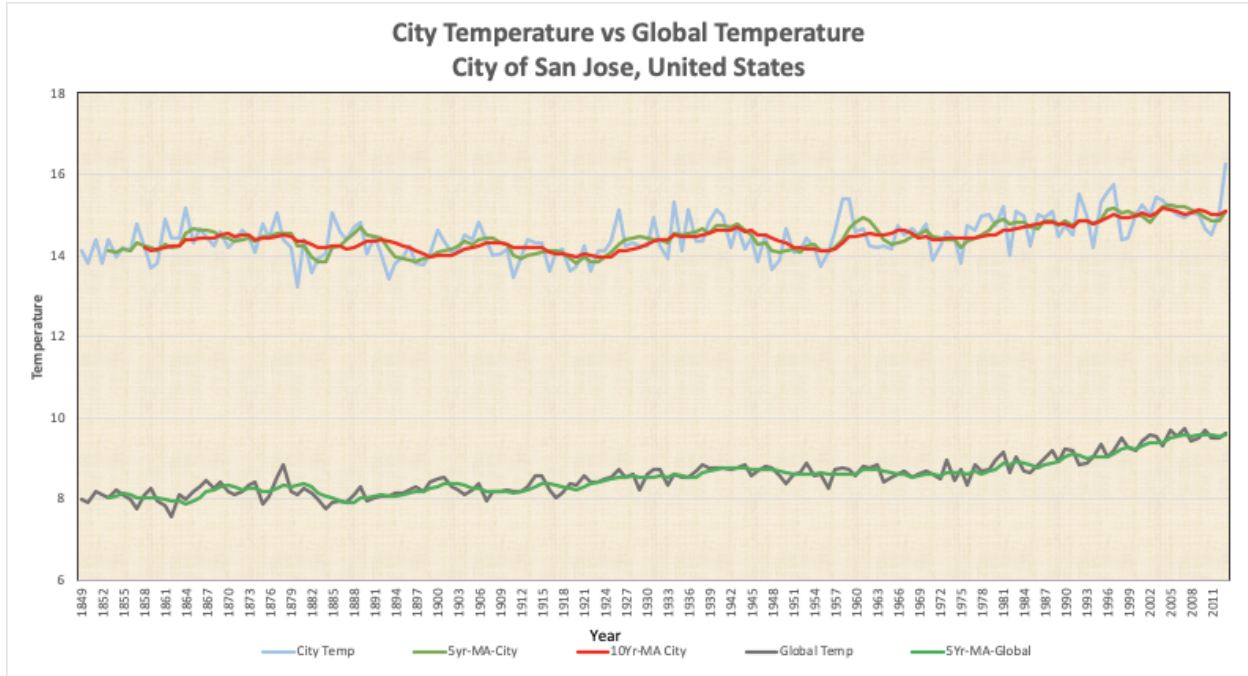


Fig 2: San Jose Trend Graph

For Raw data **See Appendix: Data - San Jose, United States vs Global Data (Raw)**

Step 5: Interpreting the data

1. The yearly temperature of San Jose City is about 6-8 degrees higher than Global temperature.
2. The City's Moving Average(MA) line shows the increasing temperature trend starting from 1849 to 2013. With Max temperature on 2013
 - a.

Metrics	San Jose (Year)	Global (Year)
Min	13.22(1880)	7.56(1862)
Max	16.23(2013)	9.73(2007)

3. The Global Moving Average line also shows similar increasing Global temperature trend during the same time period 1849 - 2013
4. The **10Yr MA-City** on the San Jose City is much smoother than the **5Yr-MA-City** graph line.
 - a. For Global Data, the **5Yr-MA-Global** seems suitable to study the trend.

Step 6: Correlation

Leveraged Excel Cluster graph to show the correlation of City temperature with Global Temperature. The Y-axis represents the San Jose City Temperatures and the X-axis represents the Global Temperature.

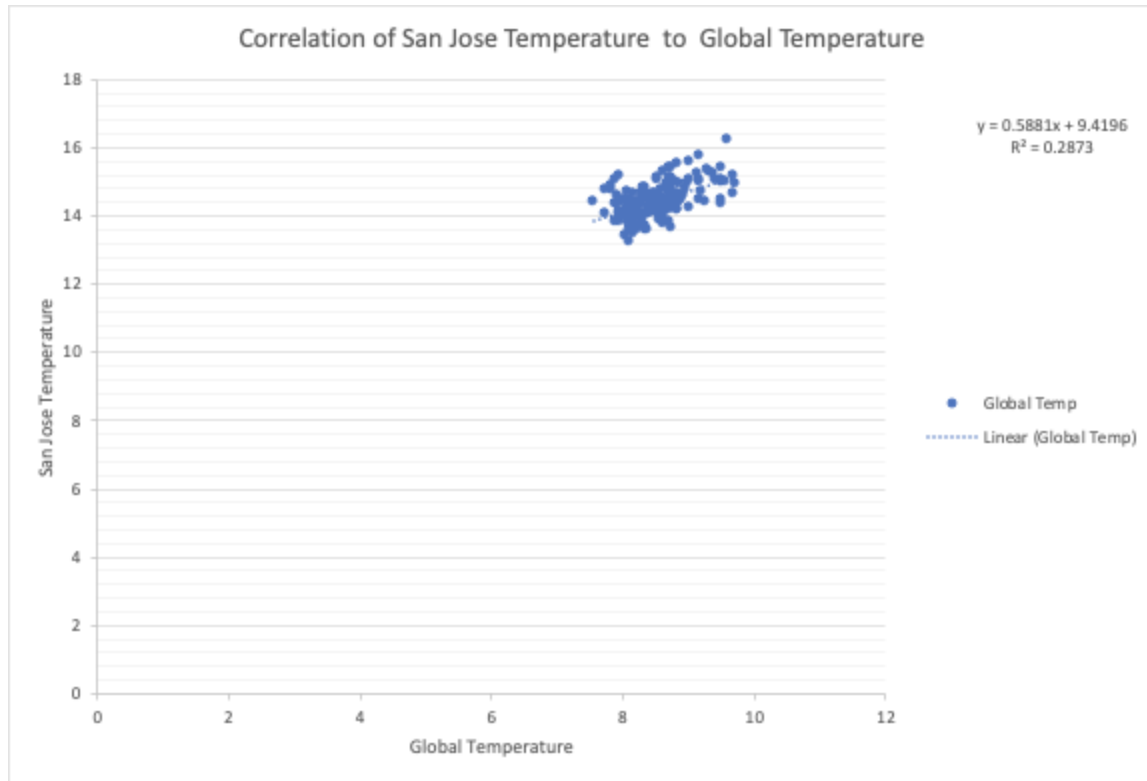


Fig 3: Correlation Graph

Shows:

$$y = 0.5881x + 9.4196$$
$$R^2 = 0.2873$$

R^2 is Correlation Coefficient and is showing a positive value indicating the San Jose City temperature Positively correlates with Global data.

Also, to Predict the San Jose City Temperature we would use the formula

$$y = 0.5881x + 9.4196$$

Favorite City - Temperature Trend Exploration

I heard from my family and friends that India is getting warmer. So I decided to explore 'New Delhi, India' data. I followed the same procedure as San Jose, United States to develop the charts.

Please see below:

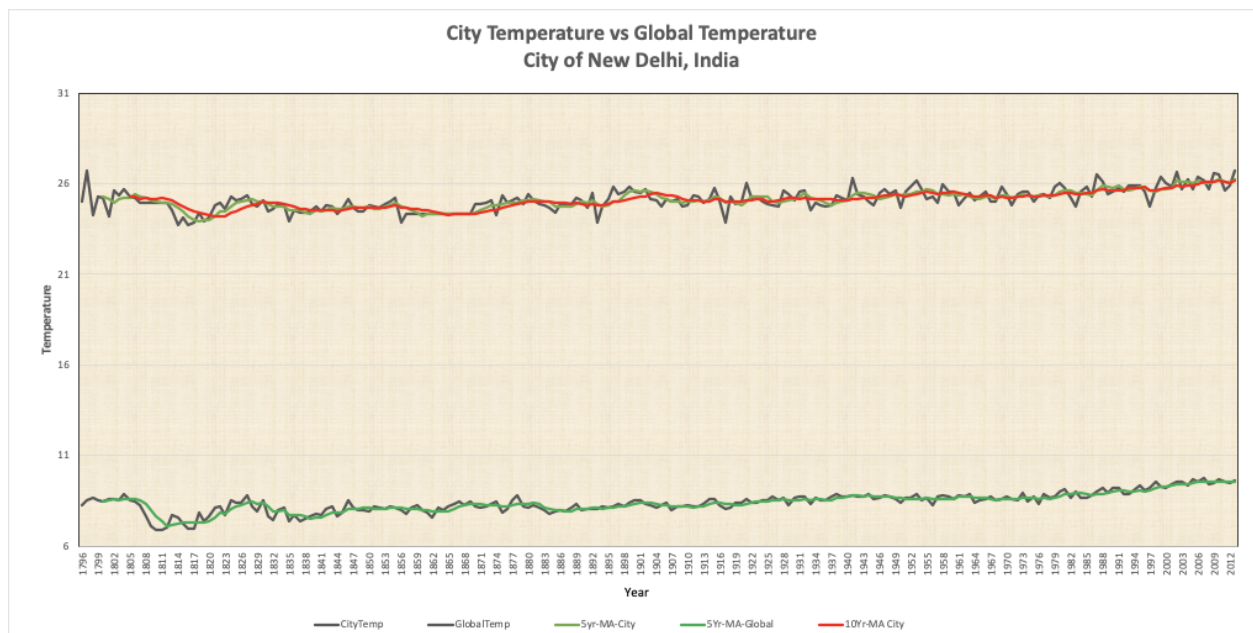


Fig 4: New Delhi Trend Graph

For Raw data See Appendix: Data - New Delhi, India vs Global Data (Raw)

Observations:

- There are 53 additional rows of data totalling to 218 rows starting from Year 1796 to 2013.
- I am observing that the temperature is about ~10 degrees hotter than San Jose City Temperature

○

Metrics	San Jose (Year)	Global (Year)
Min	23.73(1814)	6.86(1811)

Max	26.71(2013)	9.73(2007)
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- It is likely that, as New Delhi, India is 1,979 miles from the equator compared to San Jose, United States which is 2581 miles, the New Delhi is hotter than San Jose.
- There were missing temperature values for New Delhi between 1808 - 1812 and 1858 - 1869 of data
 - Instead of keeping values as 0, I replaced them with the previous Year's temperature data like 1807's data for 1808-1812 and 1857's data for 1858-1869.
- The MA line graphs shows a growing warmer trend and matches with the global temperature trend.

Appendix

1. Data - San Jose, United States vs Global Data (Raw)

City	Year	City Temp	Global Temp	5Yr-MA-City	5Yr-MA-Global	10Yr-MA City
San Jose	1849	14.12	7.98			
San Jose	1850	13.8	7.9			
San Jose	1851	14.39	8.18			
San Jose	1852	13.81	8.1			
San Jose	1853	14.4	8.04	14.104	8.04	
San Jose	1854	13.98	8.21	14.076	8.086	
San Jose	1855	14.2	8.11	14.156	8.128	
San Jose	1856	14.1	8	14.098	8.092	
San Jose	1857	14.78	7.76	14.292	8.024	
San Jose	1858	14.19	8.1	14.25	8.036	14.177
San Jose	1859	13.71	8.25	14.196	8.044	14.136
San Jose	1860	13.81	7.96	14.118	8.014	14.137
San Jose	1861	14.88	7.85	14.274	7.984	14.186
San Jose	1862	14.43	7.56	14.204	7.944	14.248
San Jose	1863	14.43	8.11	14.252	7.946	14.251
San Jose	1864	15.18	7.98	14.546	7.892	14.371
San Jose	1865	14.32	8.18	14.648	7.936	14.383
San Jose	1866	14.67	8.29	14.606	8.024	14.44
San Jose	1867	14.46	8.44	14.612	8.2	14.408
San Jose	1868	14.25	8.25	14.576	8.228	14.414
San Jose	1869	14.57	8.43	14.454	8.318	14.5
San Jose	1870	14.19	8.2	14.428	8.322	14.538

San Jose	1871	14.34	8.12	14.362	8.288	14.484
San Jose	1872	14.63	8.19	14.396	8.238	14.504
San Jose	1873	14.46	8.35	14.438	8.258	14.507
San Jose	1874	14.09	8.43	14.342	8.258	14.398
San Jose	1875	14.76	7.86	14.456	8.19	14.442
San Jose	1876	14.44	8.08	14.476	8.182	14.419
San Jose	1877	15.03	8.54	14.556	8.252	14.476
San Jose	1878	14.37	8.83	14.538	8.348	14.488
San Jose	1879	14.2	8.17	14.56	8.296	14.451
San Jose	1880	13.22	8.12	14.252	8.348	14.354
San Jose	1881	14.39	8.27	14.242	8.386	14.359
San Jose	1882	13.58	8.13	13.952	8.304	14.254
San Jose	1883	13.93	7.98	13.864	8.134	14.201
San Jose	1884	14.05	7.77	13.834	8.054	14.197
San Jose	1885	15.05	7.92	14.2	8.014	14.226
San Jose	1886	14.58	7.95	14.238	7.95	14.24
San Jose	1887	14.38	7.91	14.398	7.906	14.175
San Jose	1888	14.7	8.09	14.552	7.928	14.208
San Jose	1889	14.81	8.32	14.704	8.038	14.269
San Jose	1890	14.05	7.97	14.504	8.048	14.352
San Jose	1891	14.46	8.02	14.48	8.062	14.359
San Jose	1892	14.05	8.07	14.414	8.094	14.406
San Jose	1893	13.4	8.06	14.154	8.088	14.353
San Jose	1894	13.8	8.16	13.952	8.056	14.328
San Jose	1895	13.95	8.15	13.932	8.092	14.218
San Jose	1896	14.22	8.21	13.884	8.13	14.182
San Jose	1897	13.81	8.29	13.836	8.174	14.125

San Jose	1898	13.77	8.18
San Jose	1899	14.04	8.4
San Jose	1900	14.64	8.5
San Jose	1901	14.34	8.54
San Jose	1902	14.07	8.3
San Jose	1903	14.12	8.22
San Jose	1904	14.5	8.09
San Jose	1905	14.39	8.23
San Jose	1906	14.81	8.38
San Jose	1907	14.34	7.95
San Jose	1908	14.01	8.19
San Jose	1909	14.05	8.18
San Jose	1910	14.17	8.22
San Jose	1911	13.46	8.18
San Jose	1912	13.95	8.17
San Jose	1913	14.38	8.3
San Jose	1914	14.33	8.59
San Jose	1915	14.3	8.59
San Jose	1916	13.61	8.23
San Jose	1917	14.06	8.02
San Jose	1918	14.14	8.13
San Jose	1919	13.6	8.38
San Jose	1920	13.72	8.36
San Jose	1921	14.24	8.57
San Jose	1922	13.61	8.41
San Jose	1923	14.13	8.42
San Jose	1924	14.1	8.51

13.91	8.198	14.032
13.958	8.246	13.955
14.096	8.316	14.014
14.12	8.382	14.002
14.172	8.384	14.004
14.242	8.392	14.076
14.334	8.33	14.146
14.284	8.276	14.19
14.378	8.244	14.249
14.432	8.174	14.302
14.41	8.168	14.326
14.32	8.186	14.327
14.276	8.184	14.28
14.006	8.144	14.192
13.928	8.188	14.18
14.002	8.21	14.206
14.058	8.292	14.189
14.084	8.366	14.18
14.114	8.376	14.06
14.136	8.346	14.032
14.088	8.312	14.045
13.942	8.27	14
13.826	8.224	13.955
13.952	8.292	14.033
13.862	8.37	13.999
13.86	8.428	13.974
13.96	8.454	13.951

San Jose	1925	14.34	8.53
San Jose	1926	15.14	8.73
San Jose	1927	14.24	8.52
San Jose	1928	14.32	8.63
San Jose	1929	14.25	8.24
San Jose	1930	14.25	8.63
San Jose	1931	14.93	8.72
San Jose	1932	14.24	8.71
San Jose	1933	13.93	8.34
San Jose	1934	15.31	8.63
San Jose	1935	14.12	8.52
San Jose	1936	15.13	8.55
San Jose	1937	14.36	8.7
San Jose	1938	14.35	8.86
San Jose	1939	14.81	8.76
San Jose	1940	15.12	8.76
San Jose	1941	14.98	8.77
San Jose	1942	14.2	8.73
San Jose	1943	14.72	8.76
San Jose	1944	14.17	8.85
San Jose	1945	14.41	8.58
San Jose	1946	13.83	8.68
San Jose	1947	14.51	8.8
San Jose	1948	13.65	8.75
San Jose	1949	13.9	8.59
San Jose	1950	14.66	8.37
San Jose	1951	14.06	8.63

14.084	8.488	13.955
14.264	8.52	14.108
14.39	8.542	14.126
14.428	8.584	14.144
14.458	8.53	14.209
14.44	8.55	14.262
14.398	8.548	14.331
14.398	8.586	14.394
14.32	8.528	14.374
14.532	8.606	14.495
14.506	8.584	14.473
14.546	8.55	14.472
14.57	8.548	14.484
14.654	8.652	14.487
14.554	8.678	14.543
14.754	8.726	14.63
14.724	8.77	14.635
14.692	8.776	14.631
14.766	8.756	14.71
14.638	8.774	14.596
14.496	8.738	14.625
14.266	8.72	14.495
14.328	8.734	14.51
14.114	8.732	14.44
14.06	8.68	14.349
14.11	8.638	14.303
14.156	8.628	14.211

San Jose	1952	14.11	8.64
San Jose	1953	14.42	8.87
San Jose	1954	14.18	8.56
San Jose	1955	13.74	8.63
San Jose	1956	14.08	8.28
San Jose	1957	14.59	8.73
San Jose	1958	15.41	8.77
San Jose	1959	15.39	8.73
San Jose	1960	14.59	8.58
San Jose	1961	14.65	8.8
San Jose	1962	14.22	8.75
San Jose	1963	14.19	8.86
San Jose	1964	14.24	8.41
San Jose	1965	14.14	8.53
San Jose	1966	14.74	8.6
San Jose	1967	14.5	8.7
San Jose	1968	14.66	8.52
San Jose	1969	14.51	8.6
San Jose	1970	14.76	8.7
San Jose	1971	13.89	8.6
San Jose	1972	14.25	8.5
San Jose	1973	14.58	8.95
San Jose	1974	14.41	8.47
San Jose	1975	13.82	8.74
San Jose	1976	14.72	8.35
San Jose	1977	14.63	8.85
San Jose	1978	14.96	8.69

14.076	8.596	14.202
14.23	8.62	14.172
14.286	8.614	14.173
14.102	8.666	14.106
14.106	8.596	14.131
14.202	8.614	14.139
14.4	8.594	14.315
14.642	8.628	14.464
14.812	8.618	14.457
14.926	8.722	14.516
14.852	8.726	14.527
14.608	8.744	14.504
14.378	8.68	14.51
14.288	8.67	14.55
14.306	8.63	14.616
14.362	8.62	14.607
14.456	8.552	14.532
14.51	8.59	14.444
14.634	8.624	14.461
14.464	8.624	14.385
14.414	8.584	14.388
14.398	8.67	14.427
14.378	8.644	14.444
14.19	8.652	14.412
14.356	8.602	14.41
14.432	8.672	14.423
14.508	8.62	14.453

San Jose	1979	14.99	8.73
San Jose	1980	14.74	8.98
San Jose	1981	15.22	9.17
San Jose	1982	14	8.64
San Jose	1983	15.07	9.03
San Jose	1984	14.97	8.69
San Jose	1985	14.23	8.66
San Jose	1986	15	8.83
San Jose	1987	14.95	8.99
San Jose	1988	15.08	9.2
San Jose	1989	14.45	8.92
San Jose	1990	14.73	9.23
San Jose	1991	14.5	9.18
San Jose	1992	15.53	8.84
San Jose	1993	14.97	8.87
San Jose	1994	14.21	9.04
San Jose	1995	15.31	9.35
San Jose	1996	15.56	9.04
San Jose	1997	15.75	9.2
San Jose	1998	14.38	9.52
San Jose	1999	14.41	9.29
San Jose	2000	15.02	9.2
San Jose	2001	15.25	9.41
San Jose	2002	15	9.57
San Jose	2003	15.43	9.53
San Jose	2004	15.37	9.32
San Jose	2005	15.17	9.7

14.624	8.672	14.501
14.808	8.72	14.499
14.908	8.884	14.632
14.782	8.842	14.607
14.804	8.91	14.656
14.8	8.902	14.712
14.698	8.838	14.753
14.654	8.77	14.781
14.844	8.84	14.813
14.846	8.874	14.825
14.742	8.92	14.771
14.842	9.034	14.77
14.742	9.104	14.698
14.858	9.074	14.851
14.836	9.008	14.841
14.788	9.032	14.765
14.904	9.056	14.873
15.116	9.028	14.929
15.16	9.1	15.009
15.042	9.23	14.939
15.082	9.28	14.935
15.024	9.25	14.964
14.962	9.324	15.039
14.812	9.398	14.986
15.022	9.4	15.032
15.214	9.406	15.148
15.244	9.506	15.134

San Jose	2006	15.02	9.53	15.198	9.53	15.08
San Jose	2007	14.94	9.73	15.186	9.562	14.999
San Jose	2008	15.05	9.43	15.11	9.542	15.066
San Jose	2009	15.02	9.51	15.04	9.58	15.127
San Jose	2010	14.67	9.7	14.94	9.58	15.092
San Jose	2011	14.5	9.52	14.836	9.578	15.017
San Jose	2012	15.05	9.51	14.858	9.534	15.022
San Jose	2013	16.23	9.61	15.094	9.57	15.102

2. Data - New Delhi, India vs Global Data (Raw)

City	Year	CityTemp	GlobalTemp	5yr-MA-City	5Yr-MA-Global	10Yr-MA City
New Delhi	1796	25.03	8.27			
New Delhi	1797	26.71	8.51			
New Delhi	1798	24.29	8.67			
New Delhi	1799	25.28	8.51			
New Delhi	1800	25.21	8.48	25.304	8.488	
New Delhi	1801	24.22	8.59	25.142	8.552	
New Delhi	1802	25.63	8.58	24.926	8.566	
New Delhi	1803	25.38	8.5	25.144	8.532	
New Delhi	1804	25.68	8.84	25.224	8.598	
New Delhi	1805	25.3	8.56	25.242	8.614	25.273
New Delhi	1806	25.22	8.43	25.442	8.582	25.292
New Delhi	1807	24.97	8.28	25.31	8.522	25.118
New Delhi	1808	24.97	7.63	25.228	8.348	25.186
New Delhi	1809	24.97	7.08	25.086	7.996	25.155
New Delhi	1810	24.97	6.92	25.02	7.668	25.131

New Delhi	1811	24.97	6.86
New Delhi	1812	24.97	7.05
New Delhi	1813	24.56	7.74
New Delhi	1814	23.73	7.59
New Delhi	1815	24.09	7.24
New Delhi	1816	23.7	6.94
New Delhi	1817	23.86	6.98
New Delhi	1818	24.37	7.83
New Delhi	1819	23.9	7.37
New Delhi	1820	24.12	7.62
New Delhi	1821	24.83	8.09
New Delhi	1822	24.93	8.19
New Delhi	1823	24.63	7.72
New Delhi	1824	25.3	8.55
New Delhi	1825	25.11	8.39
New Delhi	1826	25.12	8.36
New Delhi	1827	25.36	8.81
New Delhi	1828	24.9	8.17
New Delhi	1829	24.71	7.94
New Delhi	1830	25.07	8.52
New Delhi	1831	24.43	7.64
New Delhi	1832	24.62	7.45
New Delhi	1833	24.85	8.01
New Delhi	1834	24.82	8.15
New Delhi	1835	23.9	7.39
New Delhi	1836	24.54	7.7
New Delhi	1837	24.42	7.38

24.97	7.354	25.206
24.97	7.108	25.14
24.888	7.13	25.058
24.64	7.232	24.863
24.464	7.296	24.742
24.21	7.312	24.59
23.988	7.298	24.479
23.95	7.316	24.419
23.984	7.272	24.312
23.99	7.348	24.227
24.216	7.578	24.213
24.43	7.82	24.209
24.482	7.798	24.216
24.762	8.034	24.373
24.96	8.188	24.475
25.018	8.242	24.617
25.104	8.366	24.767
25.158	8.456	24.82
25.04	8.334	24.901
25.032	8.36	24.996
24.894	8.216	24.956
24.746	7.944	24.925
24.736	7.912	24.947
24.758	7.954	24.899
24.524	7.728	24.778
24.546	7.74	24.72
24.506	7.726	24.626

New Delhi	1838	24.38	7.51	24.412	7.626	24.574
New Delhi	1839	24.45	7.63	24.338	7.522	24.548
New Delhi	1840	24.72	7.8	24.502	7.604	24.513
New Delhi	1841	24.49	7.69	24.492	7.602	24.519
New Delhi	1842	24.78	8.02	24.564	7.73	24.535
New Delhi	1843	24.75	8.17	24.638	7.862	24.525
New Delhi	1844	24.36	7.65	24.62	7.866	24.479
New Delhi	1845	24.6	7.85	24.596	7.876	24.549
New Delhi	1846	25.16	8.55	24.73	8.048	24.611
New Delhi	1847	24.66	8.09	24.706	8.062	24.635
New Delhi	1848	24.45	7.98	24.646	8.024	24.642
New Delhi	1849	24.49	7.98	24.672	8.09	24.646
New Delhi	1850	24.78	7.9	24.708	8.1	24.652
New Delhi	1851	24.76	8.18	24.628	8.026	24.679
New Delhi	1852	24.65	8.1	24.626	8.028	24.666
New Delhi	1853	24.88	8.04	24.712	8.04	24.679
New Delhi	1854	25.02	8.21	24.818	8.086	24.745
New Delhi	1855	25.24	8.11	24.91	8.128	24.809
New Delhi	1856	23.86	8	24.73	8.092	24.679
New Delhi	1857	24.3	7.76	24.66	8.024	24.643
New Delhi	1858	24.3	8.1	24.544	8.036	24.628
New Delhi	1859	24.3	8.25	24.4	8.044	24.609
New Delhi	1860	24.3	7.96	24.212	8.014	24.561
New Delhi	1861	24.3	7.85	24.3	7.984	24.515
New Delhi	1862	24.3	7.56	24.3	7.944	24.48
New Delhi	1863	24.3	8.11	24.3	7.946	24.422
New Delhi	1864	24.3	7.98	24.3	7.892	24.35

New Delhi	1865	24.3	8.18	24.3	7.936	24.256
New Delhi	1866	24.3	8.29	24.3	8.024	24.3
New Delhi	1867	24.3	8.44	24.3	8.2	24.3
New Delhi	1868	24.3	8.25	24.3	8.228	24.3
New Delhi	1869	24.3	8.43	24.3	8.318	24.3
New Delhi	1870	24.89	8.2	24.418	8.322	24.359
New Delhi	1871	24.88	8.12	24.534	8.288	24.417
New Delhi	1872	24.94	8.19	24.662	8.238	24.481
New Delhi	1873	25.06	8.35	24.814	8.258	24.557
New Delhi	1874	24.25	8.43	24.804	8.258	24.552
New Delhi	1875	25.38	7.86	24.902	8.19	24.66
New Delhi	1876	24.93	8.08	24.912	8.182	24.723
New Delhi	1877	25.08	8.54	24.94	8.252	24.801
New Delhi	1878	25.18	8.83	24.964	8.348	24.889
New Delhi	1879	24.86	8.17	25.086	8.296	24.945
New Delhi	1880	25.45	8.12	25.1	8.348	25.001
New Delhi	1881	25.09	8.27	25.132	8.386	25.022
New Delhi	1882	24.89	8.13	25.094	8.304	25.017
New Delhi	1883	24.82	7.98	25.022	8.134	24.993
New Delhi	1884	24.67	7.77	24.984	8.054	25.035
New Delhi	1885	24.38	7.92	24.77	8.014	24.935
New Delhi	1886	24.89	7.95	24.73	7.95	24.931
New Delhi	1887	24.9	7.91	24.732	7.906	24.913
New Delhi	1888	24.88	8.09	24.744	7.928	24.883
New Delhi	1889	25.21	8.32	24.852	8.038	24.918
New Delhi	1890	25.06	7.97	24.988	8.048	24.879
New Delhi	1891	24.68	8.02	24.946	8.062	24.838

New Delhi	1892	25.49	8.07	25.064	8.094	24.898
New Delhi	1893	23.84	8.06	24.856	8.088	24.8
New Delhi	1894	24.74	8.16	24.762	8.056	24.807
New Delhi	1895	25.15	8.15	24.78	8.092	24.884
New Delhi	1896	25.83	8.21	25.01	8.13	24.978
New Delhi	1897	25.39	8.29	24.99	8.174	25.027
New Delhi	1898	25.55	8.18	25.332	8.198	25.094
New Delhi	1899	25.86	8.4	25.556	8.246	25.159
New Delhi	1900	25.56	8.5	25.638	8.316	25.209
New Delhi	1901	25.49	8.54	25.57	8.382	25.29
New Delhi	1902	25.66	8.3	25.624	8.384	25.307
New Delhi	1903	25.14	8.22	25.542	8.392	25.437
New Delhi	1904	25.07	8.09	25.384	8.33	25.47
New Delhi	1905	24.75	8.23	25.222	8.276	25.43
New Delhi	1906	25.17	8.38	25.158	8.244	25.364
New Delhi	1907	25.02	7.95	25.03	8.174	25.327
New Delhi	1908	25.14	8.19	25.03	8.168	25.286
New Delhi	1909	24.75	8.18	24.966	8.186	25.175
New Delhi	1910	24.81	8.22	24.978	8.184	25.1
New Delhi	1911	25.36	8.18	25.016	8.144	25.087
New Delhi	1912	25.25	8.17	25.062	8.188	25.046
New Delhi	1913	24.94	8.3	25.022	8.21	25.026
New Delhi	1914	25.12	8.59	25.096	8.292	25.031
New Delhi	1915	25.73	8.59	25.28	8.366	25.129
New Delhi	1916	25.07	8.23	25.222	8.376	25.119
New Delhi	1917	23.84	8.02	24.94	8.346	25.001
New Delhi	1918	25.28	8.13	25.008	8.312	25.015

New Delhi	1919	24.84	8.38	24.952	8.27	25.024
New Delhi	1920	24.99	8.36	24.804	8.224	25.042
New Delhi	1921	26.04	8.57	24.998	8.292	25.11
New Delhi	1922	25.18	8.41	25.266	8.37	25.103
New Delhi	1923	25.26	8.42	25.262	8.428	25.135
New Delhi	1924	24.98	8.51	25.29	8.454	25.121
New Delhi	1925	24.85	8.53	25.262	8.488	25.033
New Delhi	1926	24.78	8.73	25.01	8.52	25.004
New Delhi	1927	24.73	8.52	24.92	8.542	25.093
New Delhi	1928	25.65	8.63	24.998	8.584	25.13
New Delhi	1929	25.39	8.24	25.08	8.53	25.185
New Delhi	1930	25.1	8.63	25.13	8.55	25.196
New Delhi	1931	25.58	8.72	25.29	8.548	25.15
New Delhi	1932	25.63	8.71	25.47	8.586	25.195
New Delhi	1933	24.52	8.34	25.244	8.528	25.121
New Delhi	1934	24.96	8.63	25.158	8.606	25.119
New Delhi	1935	24.81	8.52	25.1	8.584	25.115
New Delhi	1936	24.76	8.55	24.936	8.55	25.113
New Delhi	1937	24.81	8.7	24.772	8.548	25.121
New Delhi	1938	25.36	8.86	24.94	8.652	25.092
New Delhi	1939	25.24	8.76	24.996	8.678	25.077
New Delhi	1940	25.07	8.76	25.048	8.726	25.074
New Delhi	1941	26.3	8.77	25.356	8.77	25.146
New Delhi	1942	25.4	8.73	25.474	8.776	25.123
New Delhi	1943	25.25	8.76	25.452	8.756	25.196
New Delhi	1944	24.98	8.85	25.4	8.774	25.198
New Delhi	1945	24.78	8.58	25.342	8.738	25.195

New Delhi	1946	25.47	8.68	25.176	8.72	25.266
New Delhi	1947	25.72	8.8	25.24	8.734	25.357
New Delhi	1948	25.45	8.75	25.28	8.732	25.366
New Delhi	1949	25.6	8.59	25.404	8.68	25.402
New Delhi	1950	24.66	8.37	25.38	8.638	25.361
New Delhi	1951		8.63	25.3575	8.628	25.2566667
New Delhi	1952	25.84	8.64	25.3875	8.596	25.3055556
New Delhi	1953	26.14	8.87	25.56	8.62	25.4044444
New Delhi	1954	25.68	8.56	25.58	8.614	25.4822222
New Delhi	1955	25.15	8.63	25.7025	8.666	25.5233333
New Delhi	1956	25.3	8.28	25.622	8.596	25.5044444
New Delhi	1957	24.91	8.73	25.436	8.614	25.4144444
New Delhi	1958	25.93	8.77	25.394	8.594	25.4677778
New Delhi	1959	25.56	8.73	25.37	8.628	25.4633333
New Delhi	1960	25.53	8.58	25.446	8.618	25.56
New Delhi	1961	24.8	8.8	25.346	8.722	25.484
New Delhi	1962	25.18	8.75	25.4	8.726	25.418
New Delhi	1963	25.46	8.86	25.306	8.744	25.35
New Delhi	1964	25.05	8.41	25.204	8.68	25.287
New Delhi	1965	25.26	8.53	25.15	8.67	25.298
New Delhi	1966	25.52	8.6	25.294	8.63	25.32
New Delhi	1967	24.98	8.7	25.254	8.62	25.327
New Delhi	1968	25.02	8.52	25.166	8.552	25.236
New Delhi	1969	25.8	8.6	25.316	8.59	25.26
New Delhi	1970	25.39	8.7	25.342	8.624	25.246
New Delhi	1971	24.81	8.6	25.2	8.624	25.247
New Delhi	1972	25.42	8.5	25.288	8.584	25.271

New Delhi	1973	25.56	8.95
New Delhi	1974	25.52	8.47
New Delhi	1975	25.02	8.74
New Delhi	1976	25.33	8.35
New Delhi	1977	25.41	8.85
New Delhi	1978	25.21	8.69
New Delhi	1979	25.81	8.73
New Delhi	1980	26.02	8.98
New Delhi	1981	25.79	9.17
New Delhi	1982	25.18	8.64
New Delhi	1983	24.75	9.03
New Delhi	1984	25.56	8.69
New Delhi	1985	25.86	8.66
New Delhi	1986	25.31	8.83
New Delhi	1987	26.54	8.99
New Delhi	1988	26.11	9.2
New Delhi	1989	25.43	8.92
New Delhi	1990	25.54	9.23
New Delhi	1991	25.74	9.18
New Delhi	1992	25.52	8.84
New Delhi	1993	25.92	8.87
New Delhi	1994	25.87	9.04
New Delhi	1995	25.92	9.35
New Delhi	1996	25.55	9.04
New Delhi	1997	24.71	9.2
New Delhi	1998	25.77	9.52

25.396	8.67	25.281
25.34	8.644	25.328
25.266	8.652	25.304
25.37	8.602	25.285
25.368	8.672	25.328
25.298	8.62	25.347
25.356	8.672	25.348
25.556	8.72	25.411
25.648	8.884	25.509
25.602	8.842	25.485
25.51	8.91	25.404
25.46	8.902	25.408
25.428	8.838	25.492
25.332	8.77	25.49
25.604	8.84	25.603
25.876	8.874	25.693
25.85	8.92	25.655
25.786	9.034	25.607
25.872	9.104	25.602
25.668	9.074	25.636
25.63	9.008	25.753
25.718	9.032	25.784
25.794	9.056	25.79
25.756	9.028	25.814
25.594	9.1	25.631
25.564	9.23	25.597

New Delhi	1999	26.36	9.29
New Delhi	2000	26.05	9.2
New Delhi	2001	25.86	9.41
New Delhi	2002	26.63	9.57
New Delhi	2003	25.72	9.53
New Delhi	2004	26.24	9.32
New Delhi	2005	25.72	9.7
New Delhi	2006	26.37	9.53
New Delhi	2007	26.15	9.73
New Delhi	2008	25.68	9.43
New Delhi	2009	26.55	9.51
New Delhi	2010	26.52	9.7
New Delhi	2011	25.63	9.52
New Delhi	2012	25.89	9.51
New Delhi	2013	26.71	9.61

25.662	9.28	25.69
25.688	9.25	25.741
25.75	9.324	25.753
26.134	9.398	25.864
26.124	9.4	25.844
26.1	9.406	25.881
26.034	9.506	25.861
26.136	9.53	25.943
26.04	9.562	26.087
26.032	9.542	26.078
26.094	9.58	26.097
26.254	9.58	26.144
26.106	9.578	26.121
26.054	9.534	26.047
26.26	9.57	26.146