

Step 1 - Extract the data

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|---------------------|--|
| ① Global_data | <code>select year, avg_temp from global_data</code> |
| ② 'Seoul' (my city) | <code>select year, avg_temp, city from city_data where city = 'Seoul'</code> |
| ③ 'New Delhi' | <code>select year, avg_temp, city from city_data where city = 'New Delhi'</code> |
| ④ 'New York' | <code>select year, avg_temp, city from city_data where city = 'New York'</code> |

Step 2 - Create a line chart

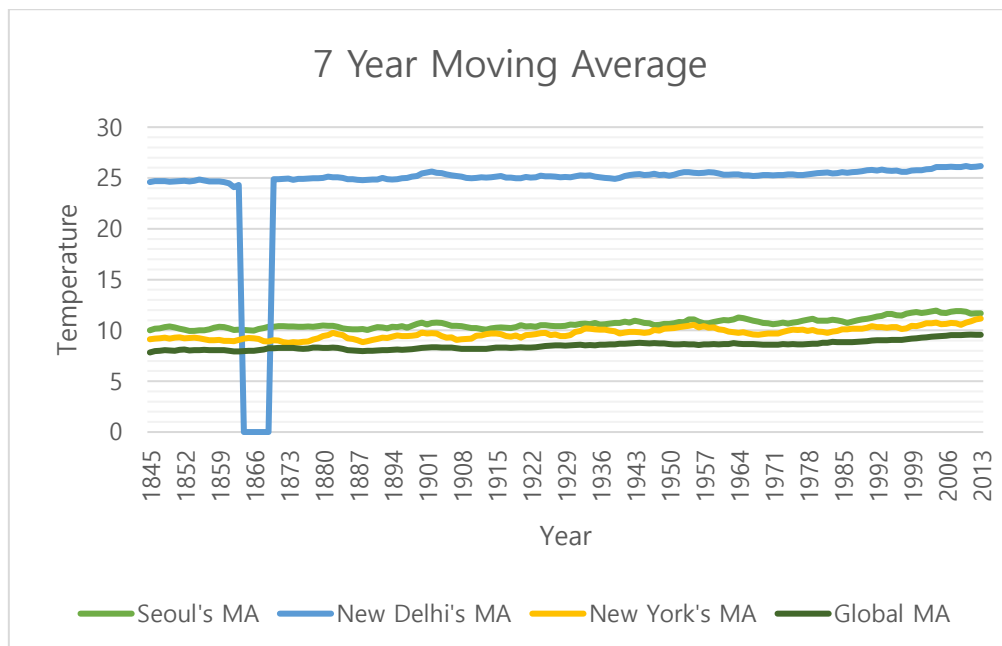
- ① Open up the CSV by using Excel

| YEAR | SEOUL | NEW DELHI | NEW YORK | WORLD |
|------|-------|-----------|----------|-------|
| 1839 | 9.47 | 24.45 | 9.17 | 7.63 |
| 1840 | 10.21 | 24.72 | 9.27 | 7.8 |
| 1841 | 9.44 | 24.49 | 9 | 7.69 |
| 1842 | 10.13 | 24.78 | 9.41 | 8.02 |
| 1843 | 10.33 | 24.75 | 8.49 | 8.17 |
| 1844 | 10.15 | 24.36 | 9.12 | 7.65 |
| 1845 | 10.25 | 24.6 | 9.49 | 7.85 |
| ... | ... | ... | ... | ... |
| 2011 | 11.12 | 25.63 | 11.27 | 9.52 |
| 2012 | 11.23 | 25.89 | 11.97 | 9.51 |
| 2013 | 12.12 | 26.71 | 12.16 | 9.61 |

② Calculate moving averages (7-year MA)

| | |
|--|---|
| <p>Seoul's MA</p> <p><u>Column (B) - Seoul</u></p> | <p>=AVERAGE(B2:B8)</p> <p>▽</p> <p>=AVERAGE(B3:B9)</p> <p>▽</p> <p>click and drag the formula down to the next cell</p> |
| <p>New Delhi's MA</p> <p><u>Column (D) – New Delhi</u></p> | <p>=AVERAGE(D2:D8)</p> <p>▽</p> <p>=AVERAGE(D3:D9)</p> <p>▽</p> <p>click and drag the formula down to the next cell</p> |
| <p>New York's MA</p> <p><u>Column (F) – New York</u></p> | <p>=AVERAGE(F2:F8)</p> <p>▽</p> <p>=AVERAGE(F3:F9)</p> <p>▽</p> <p>click and drag the formula down to the next cell</p> |
| <p>Global MA</p> <p><u>Column (H) - World</u></p> | <p>=AVERAGE(H2:H8)</p> <p>▽</p> <p>=AVERAGE(H3:H9)</p> <p>▽</p> <p>click and drag the formula down to the next cell</p> |

| YEAR | SEOUL'S MA | NEW DELHI'S MA | NEW YORK'S MA | GLOBAL MA |
|------|-------------|----------------|---------------|-------------|
| 1845 | 9.997142857 | 24.59285714 | 9.135714286 | 7.83 |
| 1846 | 10.15428571 | 24.69428571 | 9.205714286 | 7.961428571 |
| 1847 | 10.20857143 | 24.68571429 | 9.21 | 8.002857143 |
| 1848 | 10.34 | 24.68 | 9.287142857 | 8.044285714 |
| ... | ... | ... | ... | ... |
| 2011 | 11.66285714 | 26.08857143 | 10.89142857 | 9.588571429 |
| 2012 | 11.67285714 | 26.11285714 | 11.07571429 | 9.561428571 |
| 2013 | 11.68857143 | 26.16142857 | 11.16714286 | 9.572857143 |

③ Create a line chart

cf) New Delhi's temperatures (1858 – 1869) : There is no data for this time period.

My key consideration when deciding how to visualize the trends was **'making an easily understandable line chart'**.

Firstly, I tried to extract weather data of diverse countries. Therefore, I added my two favorite cities, New Delhi and New York, to my visualization. Also, I thought collecting additional weather data would help understand my city's average temperatures, because it could be compared with two other cities.

Secondly, I used several graph elements when I made this line chart. Excluding New Delhi's average temperatures, there was no distinct difference among three average temperatures including the average global temperatures. Using four different colors made my graph clearer. In addition, I added legend, major and minor gridlines to my line chart to make a more understandable graph.

Step 3 - Make observations

- ① Is my city hotter or cooler on average compared to the global average? Has the difference been consistent over time?

→ In general, my city is hotter on average compared to the global average. Also, the difference has been consistent over time. From 1845 to 2013, 'Seoul's MA' ranges from 9.9 to 11.9 degrees, but 'Global MA' ranges from 7.8 to 9.5 degrees.

- ② How do the changes in my city's temperatures over time compare to the changes in the global average?

- ③ What does the overall trend look like? Is the world getting hotter or colder? Has the trend been consistent over the last few hundred years?

→ Overall, the changes in my city's temperatures over time are similar to the changes in the global average. Of course, Seoul's temperatures and global temperatures didn't keep rising. In the short term, temperatures of my city and world temporarily had fallen. For example, from 1849 to 1854, 'Seoul's MA' had consistently dropped from 10.37 to 9.95 degrees. Also, from 1859 to 1862, 'Global MA' had consistently fallen from 8.06 to 7.92 degrees. However, both moving averages decreased from 1845 to 2013 on the whole. Therefore, I could know that global climate and Seoul's temperature had risen steadily over a long period of time.

- ④ Is there any similarity or difference among these three cities' temperatures? If then, can I guess the changes in other cities' temperatures on the basis of the information?

→ On the whole, the average temperatures in Seoul and New York are similar to each other. From 1845 to 2013, 'Seoul's MA' ranges from 9.9 to 11.9 degrees, and 'New York's MA' ranges from 8.77 to 11.16 degrees. On the other hand, in the same period, 'New Delhi's MA' ranges from 24.08 to 26.16 degrees. New

Delhi had the highest average temperatures among three countries. However, these three countries' temperatures had risen steadily over the long term. The global temperature had increased gradually over the past century as well. On the basis of this information, I can predict that other cities' average temperatures would have risen steadily over a long period of time.