Outline:

To extract the data, I used SQL to query the Udacity database. Following queries where applied to extract the needed information:

- Global Temperature:
    - *SELECT * FROM global_data WHERE year <=2013*

- Local Temperature for Munich
    - *SELECT year, avg_temp FROM city_data WHERE city = 'Munich' AND year >= 1750*

Since the data for Munich and the Global data differed in the year of beginning (Munich: 1743, Global: 1750) and end (Munich: 2013, Global: 2015), I decided to narrow down the queries to get data for both, local and global, for the same period of time (1750-2015).

For calculation of the moving average and visualization of the weather trend(s), I picked Python (for more details, please see my github profile). The following aspects played a big role in my decision making and led to Python eventually:

1. Python will play a big role in this Nanodegree program
2. I'm not a big expert in Python, so I viewed it as a opportunity to learn something new
3. I wanted to try the matplotlib

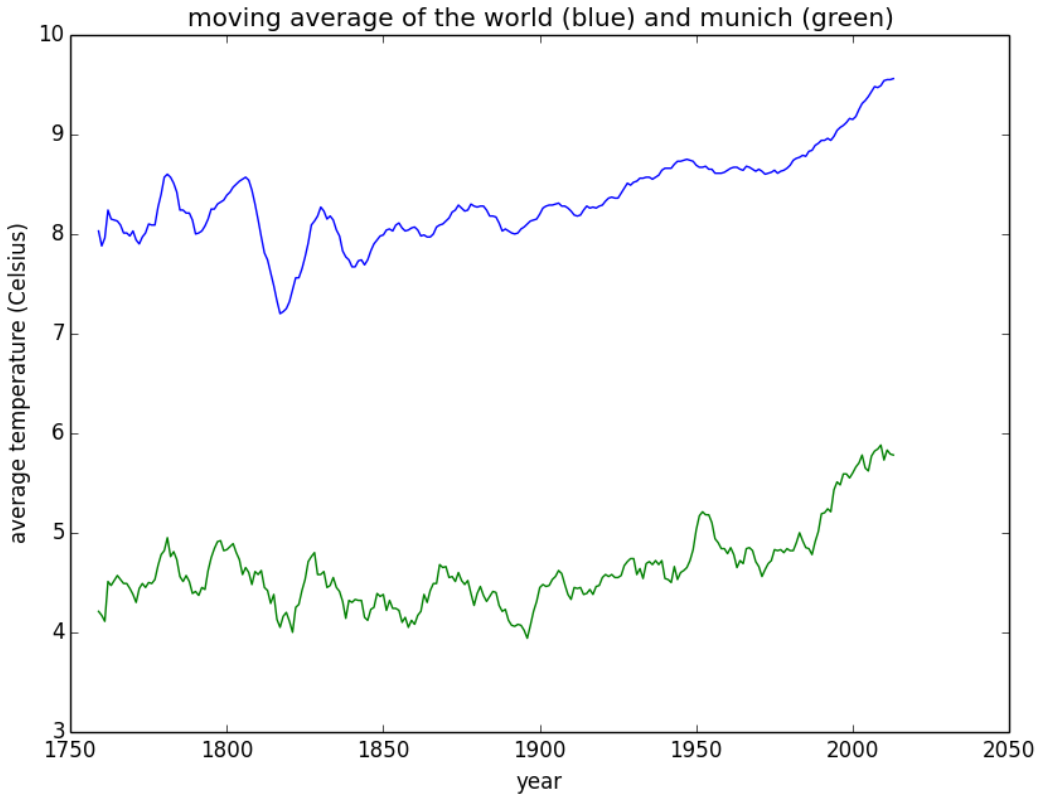
The selected moving average span was 10 years (although it is configurable via parameter). The calculation for the moving averages with a span of ten years was as followed:

1. sum up the average temperatures for the first ten years
2. calculate the average of these averages for *moving average span* times
    a. 8.72+7.98+5.78+8.39+8.47+8.36+8.85+9.02+6.74+7.99
3. divide by *moving average span*
4. save the calculated moving average for that year (in this case the 10th)
5. delete first average temperature (for year 1750 in the first iteration)
6. read avg_temp for the next year in the file
7. repeat steps 2-6 until complete file was read

You can find my implementation in the sources file MovingAverageCalculator.py in line 12-19.

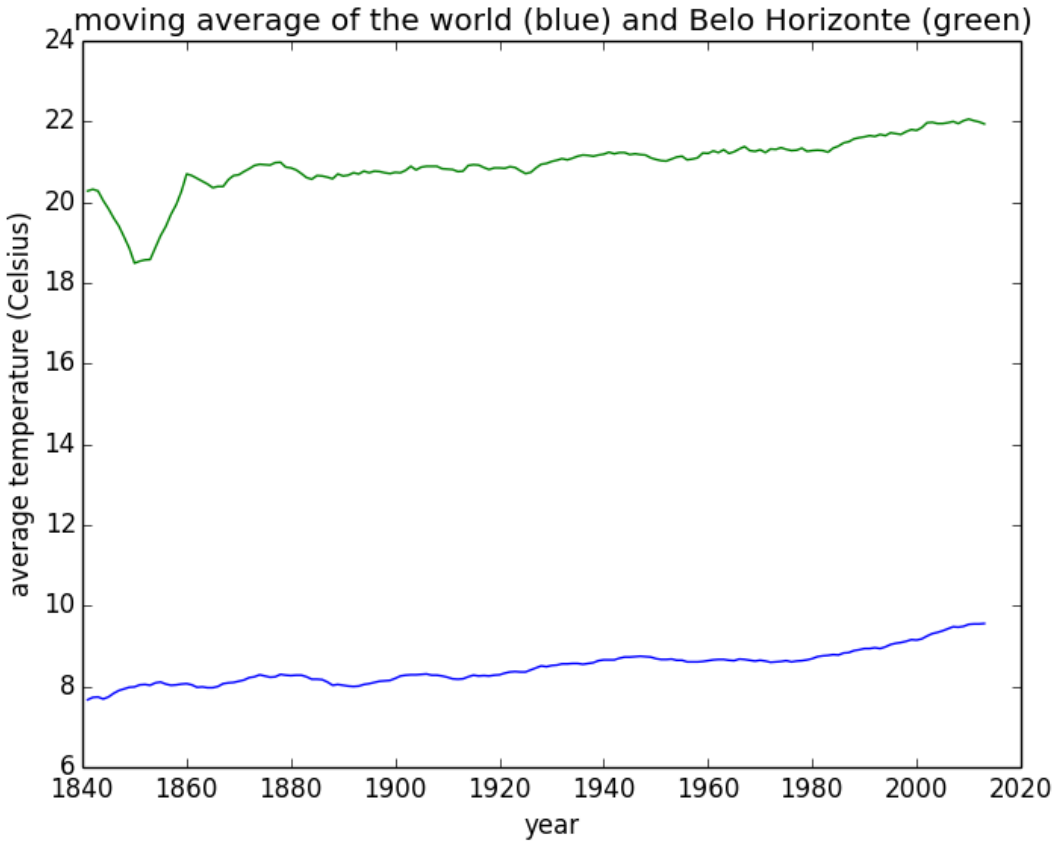
For visualization I used Python's matplotlib. Key considerations:

- easy to use
- many tutorials
- Python library



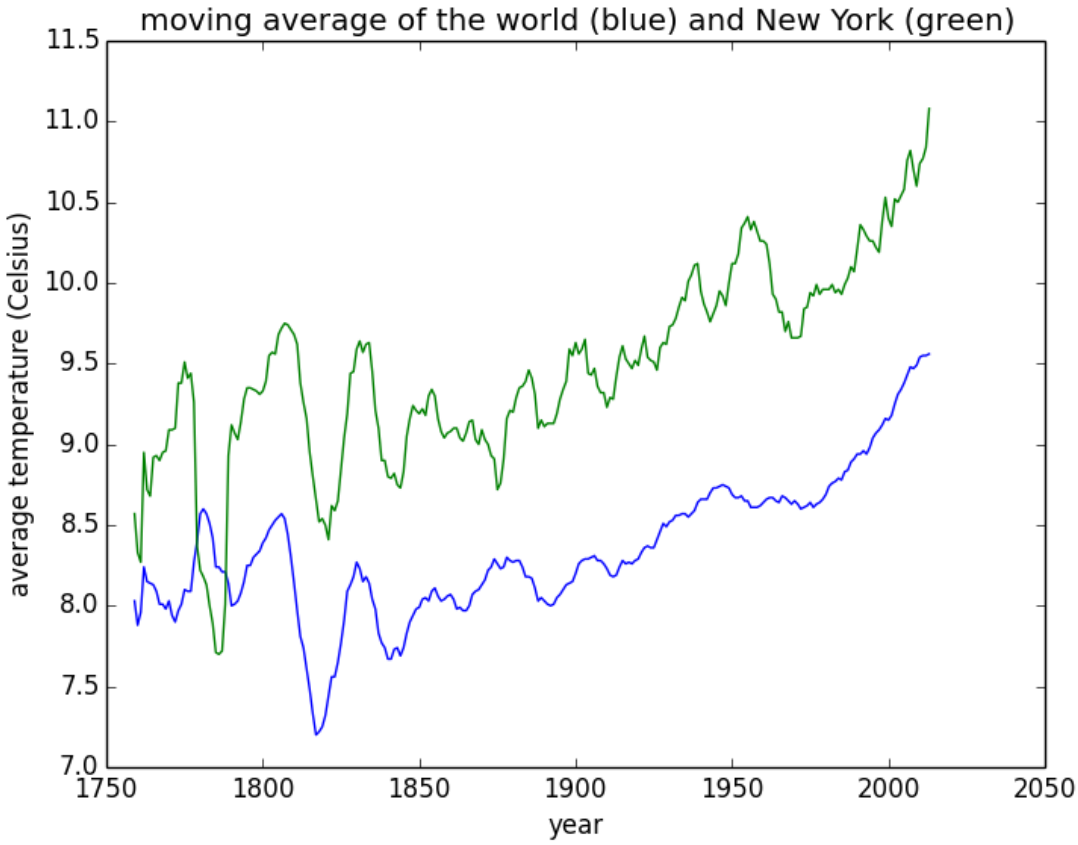
Observations about the global and local (Munich) weather trend:

- in general, the global temperature is about 3.5 – 4 degrees higher (205 times in 264 years) than in Munich (one reason might be Munich's location in central Europe)
- although having major drops and increases before, temperatures tend to soar since approximately 1900 globally consistently
- the general temperature's increase accelerated since approximately the mid 80's
- the global drop at around 1820 was not as sharp in Munich as it was globally (less than 1 degree compared to more than 1 globally). The same pattern can be seen vice versa around the year 1950, where the local rise was sharper compared to the global one
- Coefficient is 0.87 (see my Github profile, module CoefficientCalculator.py), which means global and local average temperature are corelated positively



Comparison of other cities:

- Belo Horizonte is way hotter than the global average (probably due to the location)
- Since data for Belo Horizonte is only available since 1832, the calculation of the moving average begins at about 1842
- For the missing data, the so far calculated moving average was used
- Both curves are very similar
- The magnificent drop in Belo Horizonte in the 1840's does not reflect on the global data
- Coefficient is 0.78 (see my Github profile, module CoefficientCalculator.py), which means global and local average temperature are corelated positively



- Remarkable is the big drop in New York in the mid 18th century which didn't occur globally
- The next big drop around 1820 is observable in both graphs
- Noteworthy is also the significant leap for New York around the 1950's which didn't occur globally in that manner
- The overall development is very similar
- Coefficient is 0.81 (see my Githunb profile, module CoefficientCalculator.py), which means global and local average temperature are corelated positively

Github profile for further details:

https://github.com/ErikSattelmair/Udacity_Weather_Trend