Outline

Tools:

- For data extraction SQL was used:
    - csv file: global_data
      select *
      From global_data

    - csv file: city_data , data for Berlin
      select *
      From city_data
      where city = 'Berlin'

- For data investigation and cleaning Python was used
    - Checking for NaN values
    - Comparing the timeline of data gathered globally and locally
- For data manipulation and calculations Python was used
    - Calculating moving average
    - Comparing data and certain points in time to compare local and global trends(minimum/maximum average temperature, first/last data collected, point in time from which onward temperature increase rate has increased)
- For plotting the line graph for moving average and labeling data points Python was used
    -

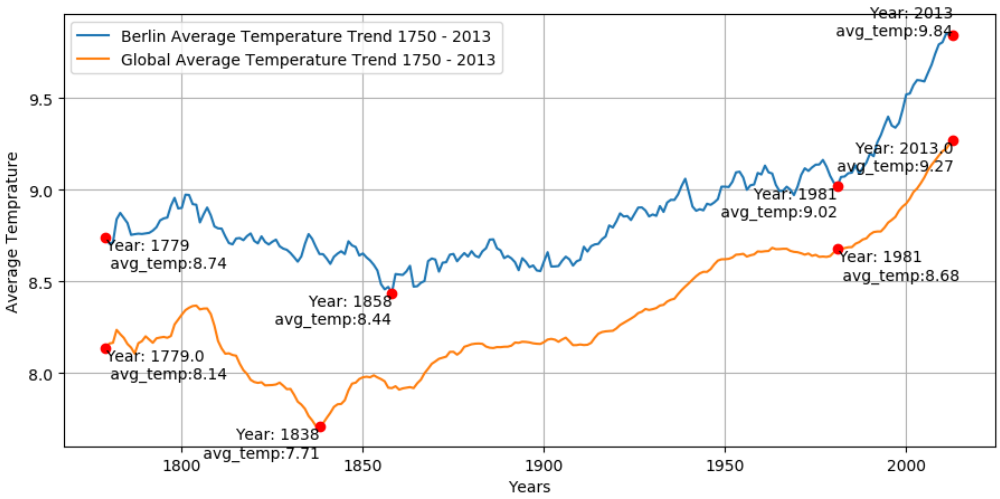
Calculation of moving average

rolling()function was used
Window was defined for 30 years
Exact line of code used:

```
berlin_data_new['mv_avg']=berlin_data_new['avg_temp'].rolling(window=30).
mean()
global_data_new['mv_avg']=global_data_new['avg_temp'].rolling(window=30).
mean()
```

Key Consideration

- Both global and local data are graphed in one plot sharing the axes so that the comparison will be effectively possible
- The time span over which the graph is plotted is the same for both global and local data
- Certain data-points in time are highlighted for better depiction of trends
- Information is easily readable and understandable



Observations:

Similarities:

- Both locally and globally an overall upward trend can be seen
    - Exception: first half of 19th century
- Between 1750 - 2013 (263 years), almost three centuries average temperature has increased more than 1 degree both locally and globally
- First half of 19th century the temperature has decreased consistently both locally and globally
- From 1981 onward the rate at which the temperature is increasing has soared. In less than 50 years the average temperature has increased more that 0.5 degree both locally and globally. That degree of change had previously happened over a timespan of more than 100 years

Differences:

- The average temperature locally has always been higher than the global average temperature. It makes sense given that the temperature of many countries of colder climate has been taken into calculation.
- The downward trend in the 19th century stopped globally by 1830 when the average temperature started rising again. But in Berlin the average temperature continued descending till 1854.
- From 1981 onward the rate at which the average temperature is increasing is higher. While the global average temperature has increased almost 0.6 degree, Berlin has experienced almost 1 degree increase in average temperature.