

Data Analyst Nanodegree

Project: Exploring Weather Trends

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1) Tools were used for each step of the project: SQL Workspace UDACITY.

a. First, SQL queries to extract the data from the database.

i. Global data:

```
SELECT *  
FROM global_data;
```

ii. City level Data: Budapest, Hungary

```
SELECT*  
FROM city_list  
WHERE city = 'Budapest';
```

```
SELECT c.city, c.year, c.avg_temp  
FROM city_data c  
WHERE city = 'Budapest'  
ORDER BY year DESC;
```

⇒ First was to observe if the city selected was present in the database.

⇒ It was observed that there would be needing the columns *year* and *avg_temp* for global and city level data.

⇒ I wanted to observe when the nearest year of temperature data was collected from this database as well.

b. Data were extracted to CSV files using the DOWNLOAD button in the SQL Workspace from UDACITY.

c. MS Excel was used to calculate the moving average and create the graphs.

2) What were your key considerations when deciding how to visualize the trends?

⇒ Firstly, the dataset from Budapest showed the observations:

- 271 years of data collected.
- with 4 years with no data (see image below)

	A	B	C	D	E
249	Budapest	1766	9.69		
250	Budapest	1765	9.8		
251	Budapest	1764	10.02		
252	Budapest	1763	9.22		
253	Budapest	1762	9.72		
254	Budapest	1761	10.13		
255	Budapest	1760	9.49		
256	Budapest	1759	9.73		
257	Budapest	1758	8.71		
258	Budapest	1757	9.92		
259	Budapest	1756	10.24		
260	Budapest	1755	9.35		
261	Budapest	1754	9.55		
262	Budapest	1753	9.66		
263	Budapest	1752	4.74		
264	Budapest	1751	10.89		
265	Budapest	1750	10.55		
266	Budapest	1749			
267	Budapest	1748			
268	Budapest	1747			
269	Budapest	1746			
270	Budapest	1745	1.79		
271	Budapest	1744	11.64		
272	Budapest	1743	4.92		
273					
274					

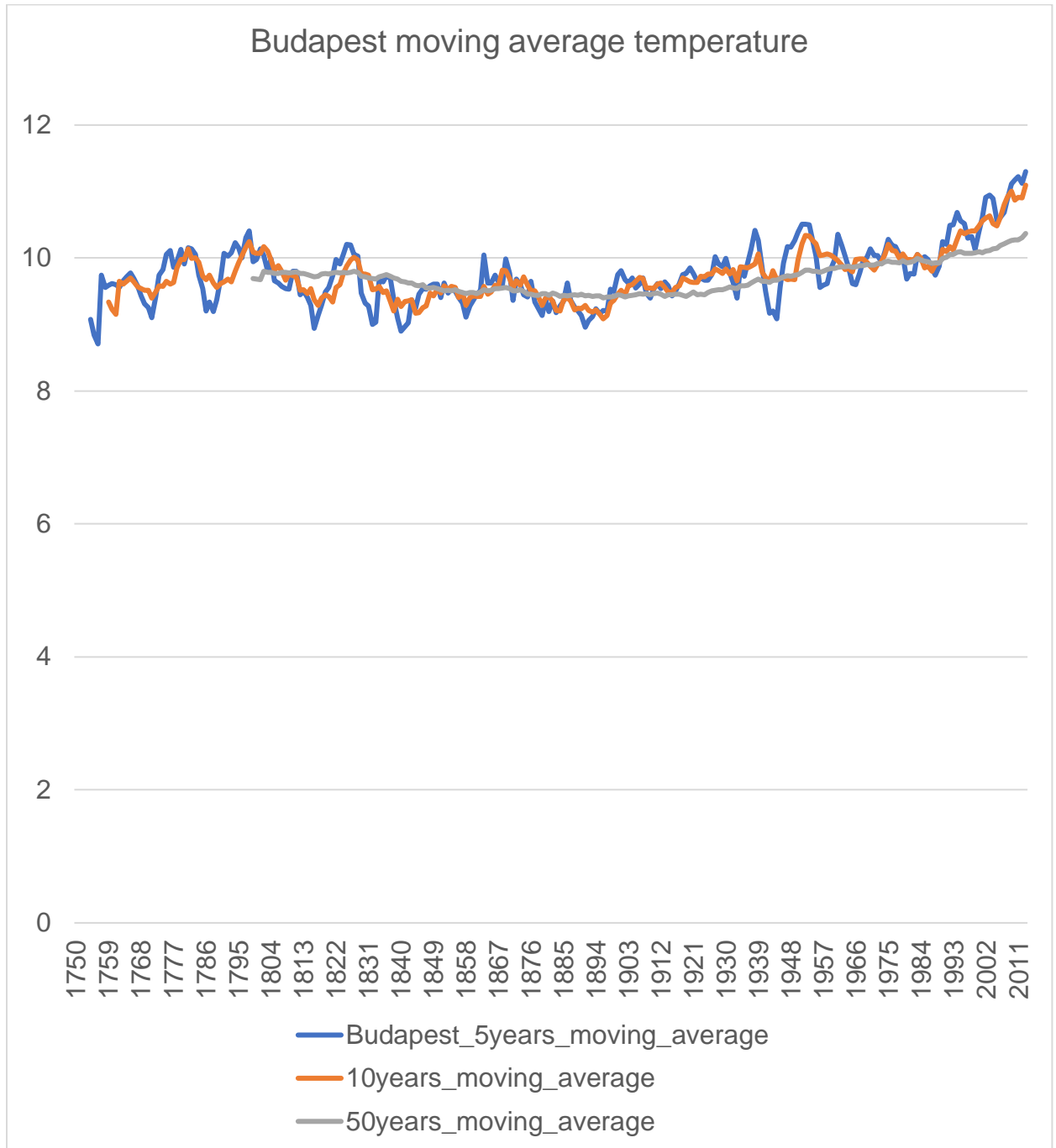
- data years were matched with Global to see the precise comparison for each year, so from 1750 to 2013.
- ⇒ I wanted to compare between 5, 10 and 50 years of moving average to see which one would provide interesting visualization from the data.

	A	B	C	D	E	F	G	H	I	J	K
1	city	year	avg_temp	5_moving_avg	10_moving_avg	50_moving_avg	GLOBAL_avg	GLOBAL_avg	5_moving_avg	10_moving_avg	50_moving_avg
2	Budapest	2013	12.44				2013	9.61			
3	Budapest	2012	11.31				2012	9.51			
4	Budapest	2011	10.92				2011	9.52			
5	Budapest	2010	10.10				2010	9.7			
6	Budapest	2009	11.48				2009	9.51			
7	Budapest	2008	11.55				2008	9.43			
8	Budapest	2007	11.82				2007	9.73			
9	Budapest	2006	10.67				2006	9.53			
10	Budapest	2005	10.05				2005	9.7			
11	Budapest	2004	10.37				2004	9.52			
12	Budapest	2003	10.51				2003	9.53			
13	Budapest	2002	11.43				2002	9.57			
14	Budapest	2001	10.47				2001	9.41			
15	Budapest	2000	11.69				2000	9.2			
16	Budapest	1999	10.64				1999	9.29			
17	Budapest	1998	10.35				1998	9.52			
18	Budapest	1997	9.89				1997	9.2			
19	Budapest	1996	9.44				1996	9.48			
20	Budapest	1995	10.34				1995	9.35			
21	Budapest	1994	11.58				1994	9.04			
22	Budapest	1993	10.22				1993	8.87			
23	Budapest	1992	11.01				1992	8.84			
24	Budapest	1991	9.66				1991	9.18			
25	Budapest	1990	10.96				1990	9.23			
26	Budapest	1989	10.19				1989	9.2			
27	Budapest	1988	9.58				1988	8.99			
28	Budapest	1987	9.58				1987	8.83			
29	Budapest	1986	9.88				1986	8.83			
30	Budapest	1985	9.11				1985	8.66			
31	Budapest	1984	9.96				1984	8.69			
32	Budapest	1983	10.7				1983	9.23			
33	Budapest	1982	10.25				1982	9.08			
34	Budapest	1981	10.06				1981	9.17			
35	Budapest	1980	8.89				1980	8.98			
36	Budapest	1979	10.38				1979	8.73			
37	Budapest	1978	9.23				1978	8.69			
38	Budapest	1977	10.28				1977	8.85			

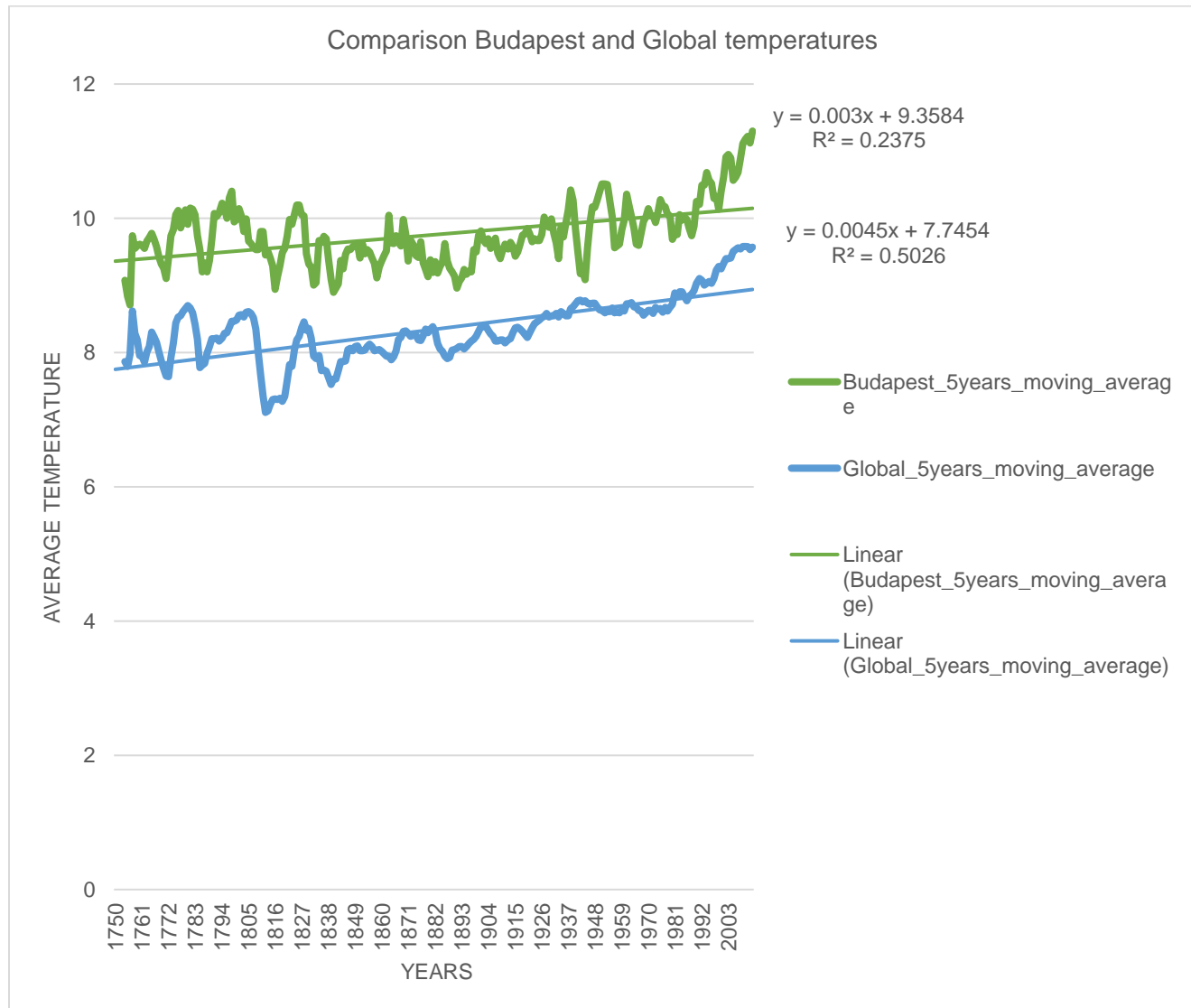
	A	B	C	D	E	F	G	H	I	J	K	L
1	city	year	avg_temp	5_moving_avg	10_moving_avg	50_moving_avg	GLOBAL_avg	GLOBAL_avg	5_moving_avg	10_moving_avg	50_moving_avg	
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4	Budapest	2011	10.92				2011	9.52				
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23	Budapest	1992	11.01				1992	8.84				
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25	Budapest	1990	10.96				1990	9.23				
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⇒ The output from the three comparisons can be seen below, where it was considered the 5 years moving average to be more interesting to the final comparison with the global trend. It clearly shows precise high picks of temperatures which could be valuable for further research in the field.



3) Line chart with local and global temperature trends



4) At least four observations about the similarities and/or differences in the trends

- Five years moving average temperatures shows that Budapest, Hungary, has higher average temperature than the global temperatures.
- The overall difference of temperature between Budapest and Global is 1.407030769 °C.
- To be able to compare them, a t-test was performed, and was able to confirm they are different from each other but indicate variables which can be considered moderately correlated (See table below).
- Budapest and Global temperature levels are both increasing with time.
- The global temperature has lower variance than Budapest temperature changes.

	Budapest	Global
MIN	4.74	5.78
MAX	12.44	9.73
MEAN	9.77193182	8.35939394
Variance	0.6896742	0.33083689
Correlation		0.55303983