

Project 1: Explore Weather Trends

Reported by Yinghao Zhang

1. Outline

1.1 Step 1: Extract the data

In this step, I used SQL to extract the data I need from the database. First, I searched for the nearest big city where I am living. So, I ran the following code and decided to choose Chengdu, China.

The screenshot shows a SQL query interface. On the left, under 'Input', there is a 'SCHEMA' section with a refresh icon and a list of tables: 'city_data', 'city_list', and 'global_data', each with a dropdown arrow. The main area displays a SQL query:

```
1 SELECT *
2 FROM city_list
3 WHERE country = 'China';
```

Below the query, a green bar indicates 'Success!'. To the right of this bar is a blue button labeled 'EVALUATE'. Below the input section, the 'Output' section shows '34 results' and a 'Download CSV' link. The output is a table with two columns: 'city' and 'country'. The table lists several cities, all of which are in China.

city	country
Anshan	China
Changchun	China
Changzhou	China
Chengdu	China
Dalian	China
Datong	China
Foshan	China
Fuzhou	China

Figure 1: The SQL script and output for choosing a city

Then I downloaded the city_data where the city is Chengdu and global_data as csv files by running the following code.

Input		HISTORY ▾	MENU ▾
SCHEMA	↻	<pre> 1 SELECT year, avg_temp 2 FROM city_data 3 WHERE city = 'Chengdu'; </pre>	
city_data	▾		
city_list	▾		
global_data	▾		
		Success!	EVALUATE
Output		194 results	Download CSV
year	avg_temp		
1820	9.14		
1821	10.29		
1822	10.39		
1823	10.68		
1824			
1825			
1826			

Figure 2: the SQL script and output of Chengdu

Input		HISTORY ▾	MENU ▾
SCHEMA	↻	<pre> 1 SELECT * 2 FROM global_data; </pre>	
city_data	▾		
city_list	▾		
global_data	▾		
		Success!	EVALUATE
Output		266 results	Download CSV
year	avg_temp		
1750	8.72		
1751	7.98		
1752	5.78		
1753	8.39		
1754	8.47		
1755	8.36		
1756	8.85		
1757	9.02		

Figure 3: The SQL script and output of global data

1.2 Step 2: Calculate the moving average

Then, I used Microsoft Excel to open up these two csv files and combined the data into one file. I created two new columns named 7-year MA, one for each dataset respectively, to calculate the 7-year moving average. The first 7-year MA is calculated by using the AVERAGE() function calculating AVERAGE(B3:B9) and AVERAGE(F3:F9). Then I dragged the cell down to the end of the data to calculate the remaining 7-year MA. All errors are replaced by null values.

	A	B	C	D	E	F	G
1	Global results				Chengdu results		
2	year	avg_temp	7-year MA		year	avg_temp	7-year MA
3	1750	8.72			1820	9.14	
4	1751	7.98			1821	10.29	
5	1752	5.78			1822	10.39	
6	1753	8.39			1823	10.68	
7	1754	8.47			1824		
8	1755	8.36			1825		
9	1756	8.85	8.08		1826		10.13
10	1757	9.02	8.12		1827		10.45
11	1758	6.74	7.94		1828		10.54
12	1759	7.99	8.26		1829		10.68
13	1760	7.19	8.09		1830		
14	1761	8.77	8.13		1831		
15	1762	8.61	8.17		1832		
16	1763	7.5	7.97		1833	10.14	10.14
17	1764	8.4	7.89		1834	10.24	10.19
18	1765	8.25	8.10		1835	9.38	9.92
19	1766	8.41	8.16		1836	9.62	9.85

Figure 4: The calculation of average moving for each dataset

1.3 Step 3: Create a line chart

Thirdly, the line chart is created by using the chart function in Excel. The key consideration is how to give the title to each axis to make information clear. The result is shown in *Section 2*.

1.4 Step 4: Make observations

Finally, the observation was given by answering some specific questions.

2. Line Chart

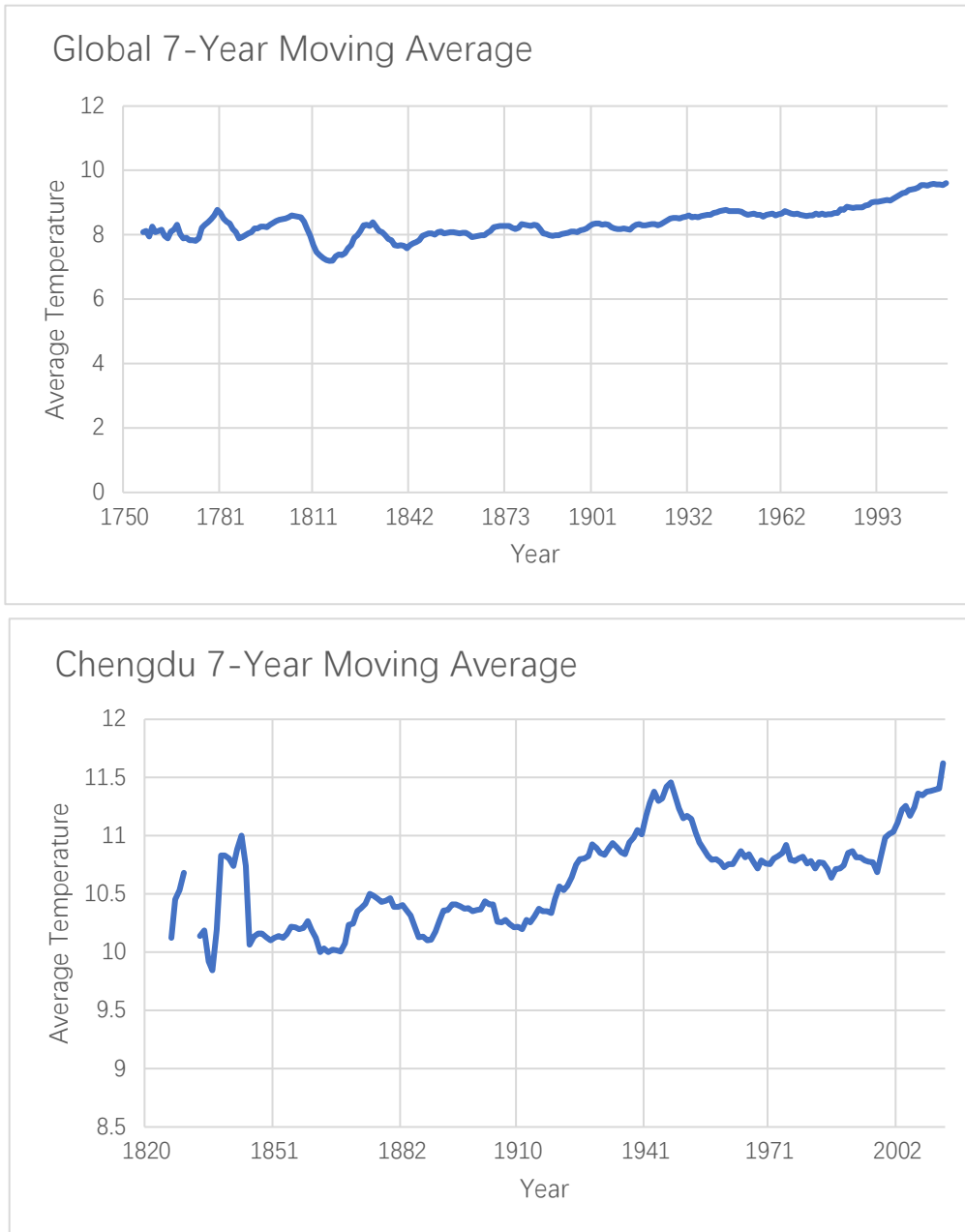


Figure 5: The line chart of the 7-year moving average in Chengdu and globe

3. Observations

Here are some observations made from the line chart:

- In global view, from 1750-1850, the average temperature faced fluctuation around 8°C. The temperature was stable from 1850 to 1920. After 1920, the average temperature increased to around 10°C in 2015.
- From 1820 to 2013, the average temperature in Chengdu faced rapid fluctuation but was rising in overall.
- Overall, the average temperature in Chengdu is higher than the global level.
- In another city called Melbourne Australia, the overall average temperature is higher than Chengdu and is increasing to around 14.5°C in 2013.

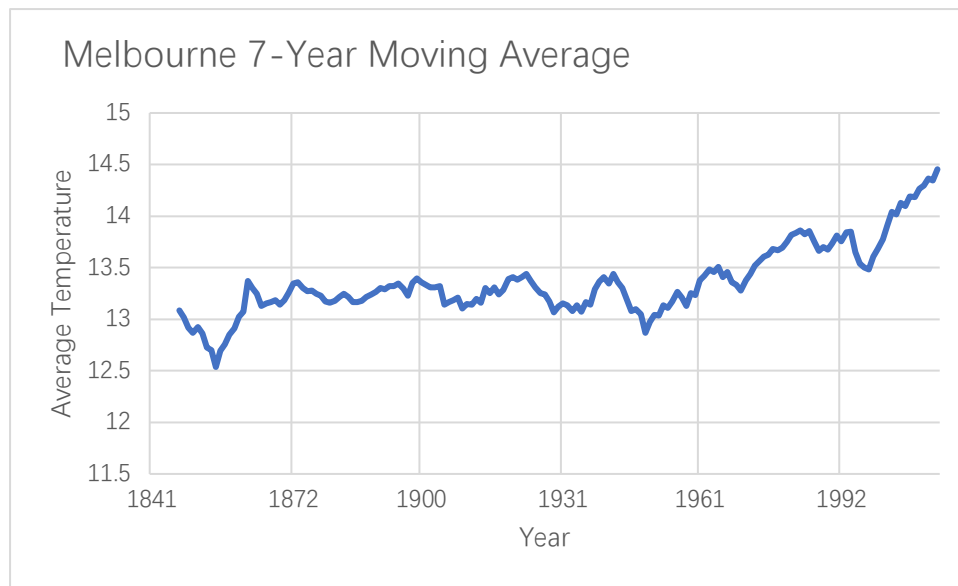


Figure 6: The line chart of the 7-year moving average in Melbourne