REPORT ON PROJECT 1

TITLE: EXPLORE WEATHER TRENDS

DATE: 3rd January 2021

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<u>Aim:</u> To create a visualization and prepare a write up describing the similarities and differences between global temperature trends and temperature trends in the closest big city to where I live.

I live in Paris and have choosen to compare global temperature data with local temperature data for Paris infer conclusions.

I carried out the project in two parts. First of all, I explored and compared the global temperature trends with my city Paris. Second part: I compared the global trend with Paris and a nearby city Berlin.

<u>**MAJOR STEPS**</u>

- Data extraction
- Data cleaning
- Data exploration & Interpretation
- Data visualisation

DATA EXTRACTION

<u>**STEP 1:**</u>

I extracted the data using SQL from the database.

- Write a SQL query to extract the city level data.
- Write a SQL query to extract the global data.

SQL query to extract the city level data

```
SELECT * FROM city_data
WHERE City = 'Paris'
```

SQL query to extract the global data

```
SELECT * FROM global_data
```

<u>**Step 2:**</u>

Downloaded and exported data to csv.

DATA CLEANING

I explored the city data within the SQL workspace and noticed some NULL values in the avg_temp column. I corrected this by applying a filter using the **WHERE** SQL query.

SELECT * FROM city_data

WHERE avg_temp IS NOT NULL
AND city = 'Paris'

The missing data resulted in a gap within the data, available data for local city Paris (ranged from 1743 to 2013) the data temperature data for the years 1746 to 1749 was missing. Meanwhile the available data for global temperature ranged from the years (1750 to 2015).

DATA EXPLORATION AND INTERPRETATION

Initially it didn't seem like a challenge but after comparing with the global temperature and an attempt to plot line chats resulted in several errors, I decided to remove the the data for 1743 to 1745 for uniformity and accuracy.

I cannot really comment on the impact but from the output of the Line chart in Excel, it was a good decision.

Final available data:

For Global temperature the data available ranged from 1750 to 2015

For local temperature (Paris) available data ranged from 1750 to 2013

OBSERVATION

Local temp for paris

The average temperature for paris between 1750 to 2013 is 10.40 ^{0}C

Ranging between 6.97^{0}C to 12.33^{0}C

For Global temp

The average temp between 1750 and 2015 is 8.36^{0}C

Ranging between 5.78^{0}C to 9.83^{0}C.

DATA VISUALISATION

TOOL: Microsoft EXCEL

STEP 1

Plotted a line chart to visualise the Local and Global temperature trends over the years.

Line graphs are better to compare or track changes over short and long periods of time. Due to smaller differences in the annual temperature changes, line graphs was a better to use in order to show trends. Also, it can also be used to compare changes over the same period of time for more than one group - In this case Paris and global data (Source: Wikipedia).
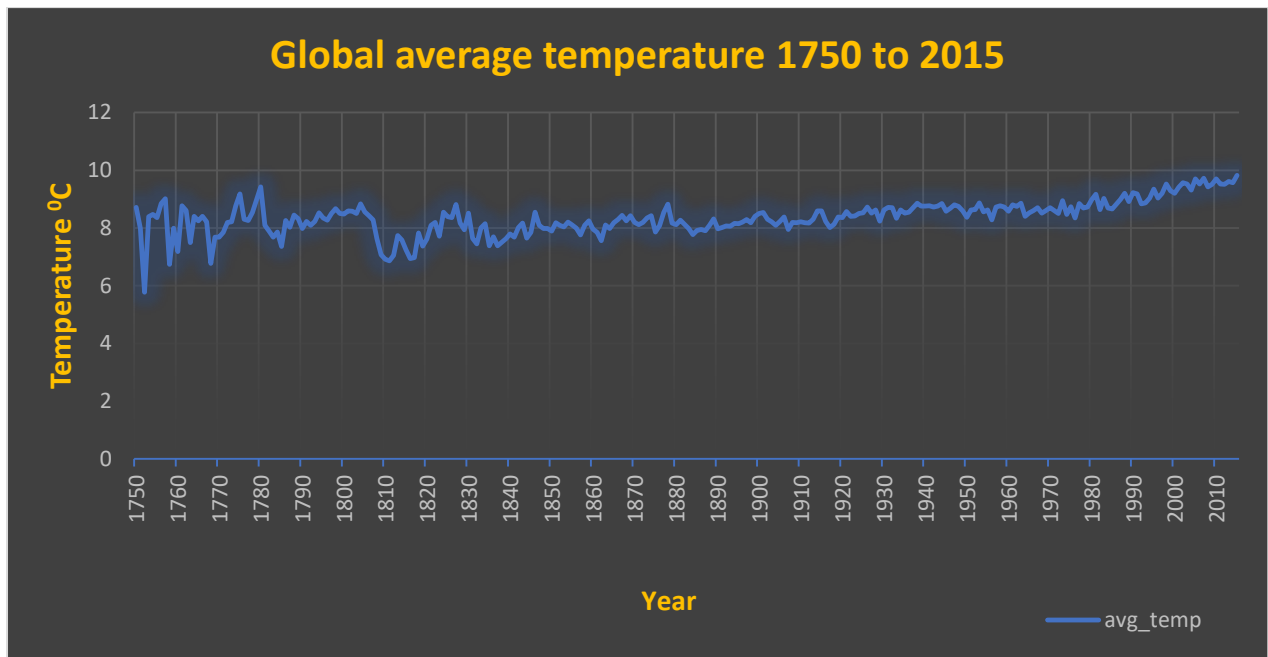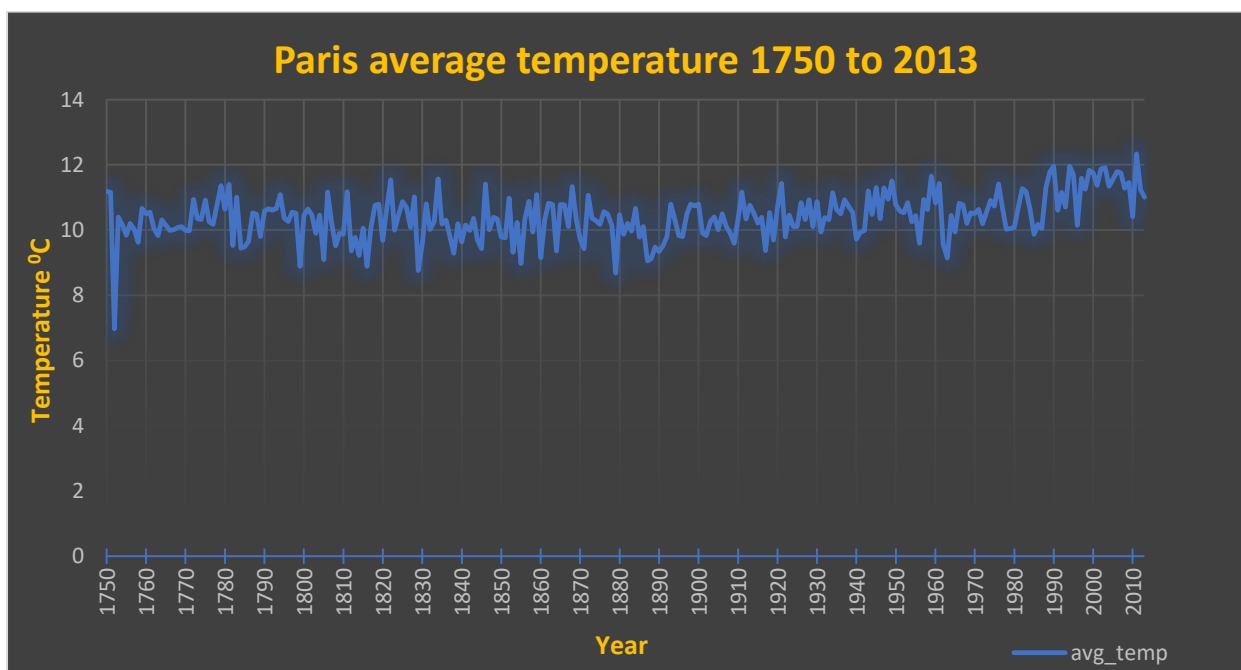

Fig. 1: Global avergae temperature for 1750 to 2015

Fig. 2: Paris average temperature for 1750 to 2013

MOVING AVERAGE

I calculated a 10year Moving avarage to smooth out the lines and make the trends more observable.

First of all, I created a second column called 10-year MA , which is where the moving average data will be stored.

I scrolled down to the tenth year and used the AVERAGE() function to calculate the average sales for the first ten years(1750 – 1759).

I did same for the next row and used excel auto function to complete the rest of the rows.

STEP 2

I plotted a line Chart using excel to compare the average temperature and the moving average for the Local and Global data.
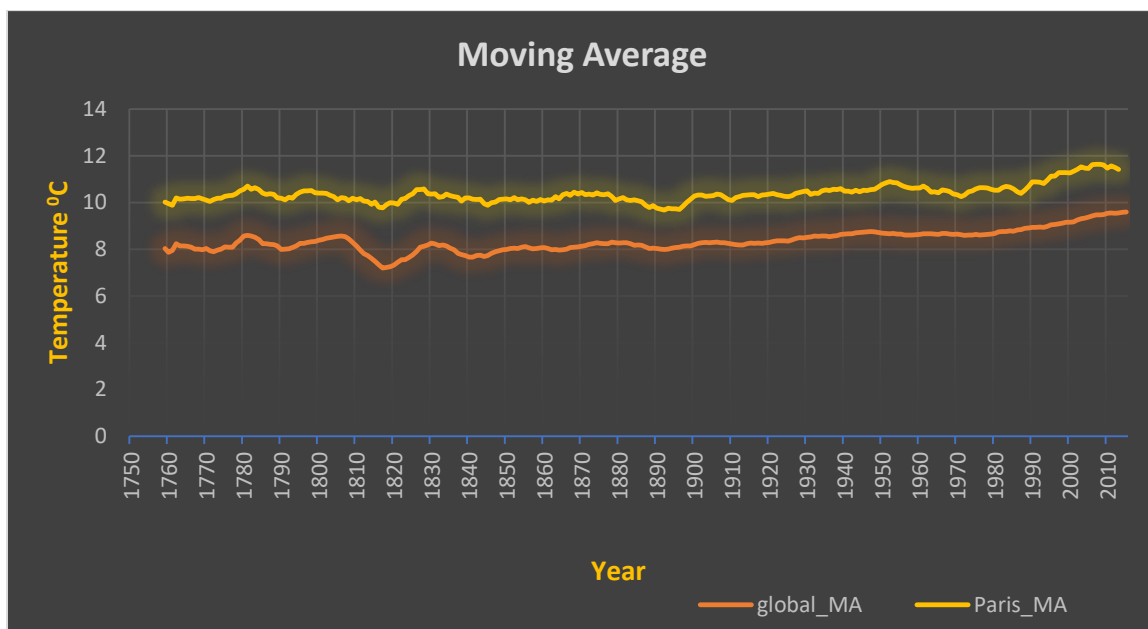

Fig. 3: 10 year Moving average for Global and Paris temperature

OBSERVATIONS

With reference to the available data, I would say that Paris is very hot compared to the global average.

There is an increasing trend per annum for both Paris and Global average data.

The difference between annual temperature for paris has been consistent and has not been more than 0.03^0C.

The global annual temperature change has been consistent. It has been increasing, not more than 0.01^0C.

Moving average for Paris data shows an increasing consistency. There is a significant increase in the values from the year 2000. This trend is also noticed in the global data.

The Moving average for global temperature showed an increase and decrease between 1750 and 1840.

The global temperature shows an increasing annual trend from 1840 to 2015. There is a big jump in the temperature data from 2000 to 2015.

Annual increase in temperature for local and global temperature is observed, there is an exponential increase from the year 2000 and it has been increasing.

PART TWO

Analysing data for Paris and nearby city. Since I live in France. I wrote an SQL query to have an overview of the available cities in the database. Also, to decide cities with complete data.

```
SELECT * FROM city_data
where country = 'Germany' OR country = 'France'
OR country = 'Italy' OR country = 'Spain'
```

This query provided a list

Barcelona
Berlin
Hamburg
Madrid
Milan
Munich
Paris
Rome
Valencia

I decided to analyse the data for Paris and Berlin.

Using SQL, I ran a query to extract data from database.

```
SELECT * FROM city_data
WHERE city = 'Berlin' OR city = 'Paris'
```

STEP 2: Data Cleaning

An overview shows that some fields for average temp are NULL. Hence I carried out data cleaning using an SQL query to remove the NULL values.

```
SELECT * FROM city_data
WHERE avg_temp IS NOT NULL
```

STEP 3: I downloaded the output as a .csv and accessed the data using excel.

I noticed there were still empty average temperature. Several attempts to remove them was not sucessful. Hence I manually removed the Null fields using excel.

Annual data 1746 to 1749 for Paris, Berlin were empty. Applying filter to the column I removed the blanks. There is still data gap between 1745 to 1750 so I deleted the column to get accurate output.

DATA VISUALISATION

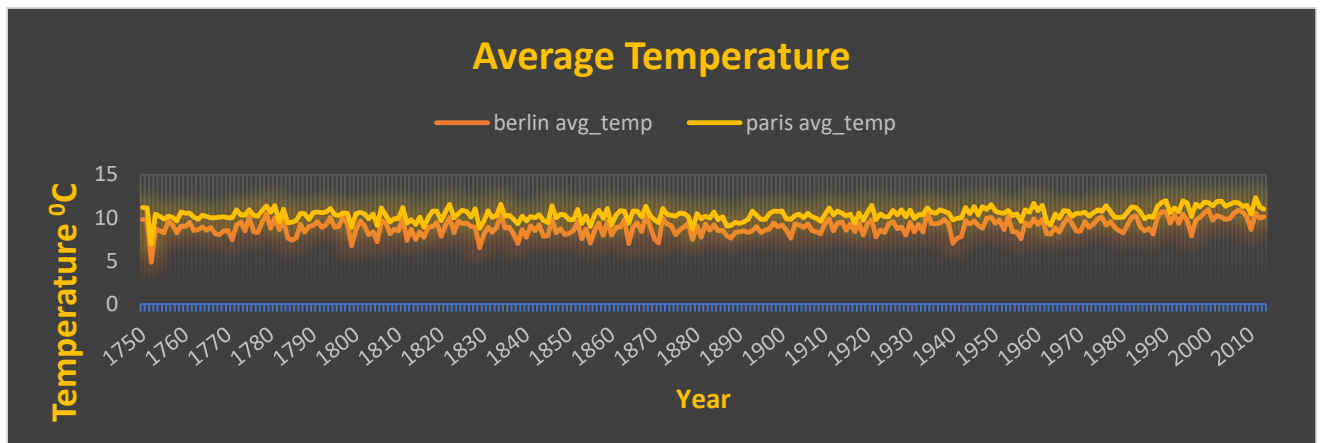I plotted the average temperature, to get an overview of the data.

Fig. 4 Average temperature for Paris and nearby city

MOVING AVERAGE

I calculated the moving average (MA) over 5years. Because the more the number of years the more trimmed the data will be, though at the detriment of the accuracy. Since I already used 7 year for the global and local data I decided to use 5 to get a different overview.
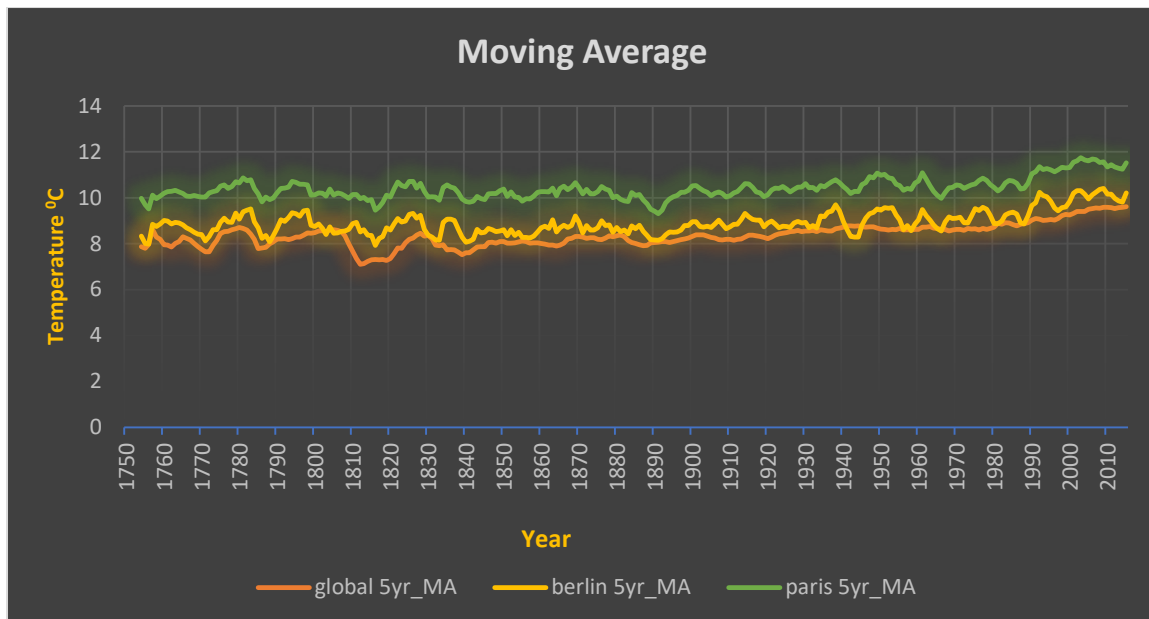
It was a little difficult to visualise the trend, hence I decided to increase the moving average by another 5 years.
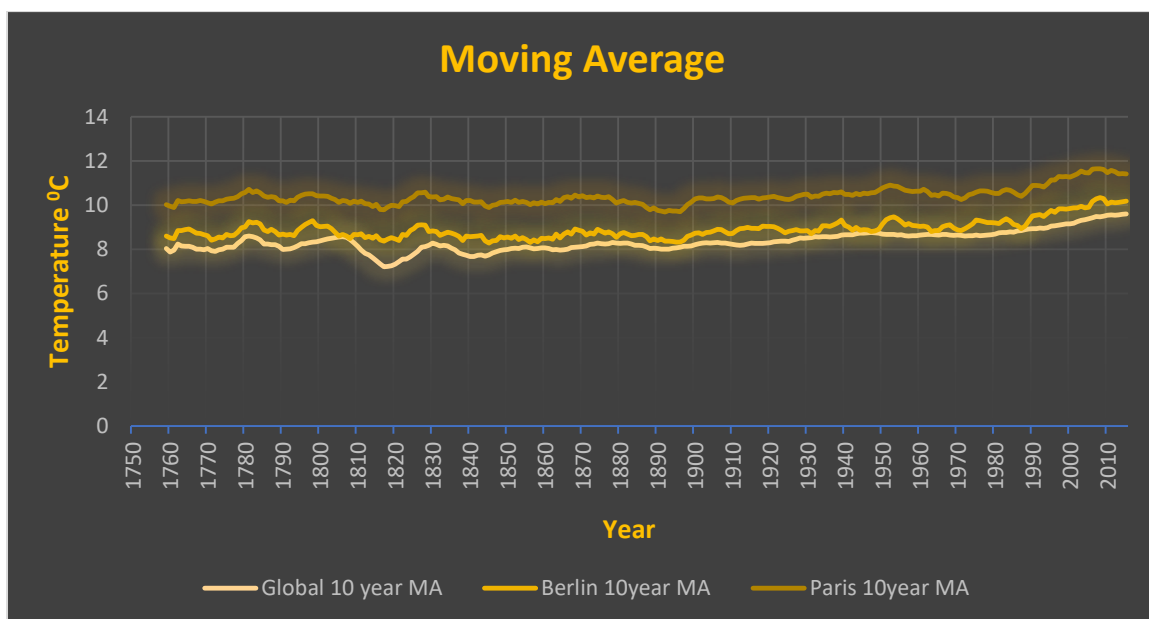
OBSERVATIONS

I see a pattern of increase and decrease in the local and global temperature, yearly. But significant decrease was recorded between 1810 and 1820.

The trend shows increasing and decreasing temperature but it seems that from 1980 there has been consistent increase and not decrease.

Comparing this data with the local temperature infers the same increasing trend.

Paris is hotter when compared to Berlin and global average temperature

Berlin is hotter compared to the average global temperature.

Increasing temperature has been recorded since 1820's, a mjor increase was recorded from the year 2000 up till 2015 a decrease was not observed.

There is a continous pattern of increase in the temperature both local and globally every year.

INDEX 1

Global and Local Temperature Data

year	global avg_temp	global_MA	paris avg_temp	Paris_MA
1750	8.72		11.18	
1751	7.98		11.15	
1752	5.78		6.97	
1753	8.39		10.4	
1754	8.47		10.15	
1755	8.36		9.84	
1756	8.85		10.2	
1757	9.02		10.02	
1758	6.74		9.62	
1759	7.99	8.03	10.66	10.019
1760	7.19	7.877	10.5	9.951
1761	8.77	7.956	10.55	9.891
1762	8.61	8.239	10.06	10.2
1763	7.5	8.15	9.83	10.143
1764	8.4	8.143	10.31	10.159
1765	8.25	8.132	10.15	10.19
1766	8.41	8.088	9.99	10.169
1767	8.22	8.008	10.01	10.168
1768	6.78	8.012	10.07	10.213
1769	7.69	7.982	10.1	10.157
1770	7.69	8.032	9.99	10.106
1771	7.85	7.94	9.98	10.049

Fig. 5 Snapshot of the Global and Local temperature data, due to the size of the data only a section is seen above

INDEX 2

DATA FOR MULTIPLE CITIES

year	global avg_temp	global 5yr_MA	Global 10 year	berlin avg_temp	berlin 5yr_M	Berlin 10yea	paris avg_temp	paris 5yr_	Paris 10year MA
1750	8.72			9.83			11.18		
1751	7.98			9.75			11.15		
1752	5.78			4.84			6.97		
1753	8.39			8.72			10.4		
1754	8.47	7.868		8.49	8.326		10.15	9.97	
1755	8.36	7.796		8.26	8.012		9.84	9.702	
1756	8.85	7.97		9.62	7.986		10.2	9.512	
1757	9.02	8.618		9.15	8.848		10.02	10.122	
1758	6.74	8.288		8.25	8.754		9.62	9.966	
1759	7.99	8.192	8.03	9.04	8.864	8.595	10.66	10.068	10.019
1760	7.19	7.958	7.877	8.99	9.01	8.511	10.5	10.2	9.951
1761	8.77	7.942	7.956	9.47	8.98	8.483	10.55	10.27	9.891
1762	8.61	7.86	8.239	8.53	8.856	8.852	10.06	10.278	10.2
1763	7.5	8.012	8.15	8.62	8.93	8.842	9.83	10.32	10.143
1764	8.4	8.094	8.143	8.91	8.904	8.884	10.31	10.25	10.159
1765	8.25	8.306	8.132	8.54	8.814	8.912	10.15	10.18	10.19
1766	8.41	8.234	8.088	8.87	8.694	8.837	9.99	10.068	10.169
1767	8.22	8.156	8.008	8.14	8.616	8.736	10.01	10.058	10.168
1768	6.78	8.012	8.012	8.03	8.498	8.714	10.07	10.106	10.213
1769	7.69	7.87	7.982	8.46	8.408	8.656	10.1	10.064	10.157
1770	7.69	7.758	8.032	8.5	8.4	8.607	9.99	10.032	10.106
1771	7.85	7.646	7.94	7.45	8.116	8.405	9.98	10.03	10.049

Fig. 6: Snapshot of the data for multiple cities and global temperature only a section is seen above due to the size of the data