Project – Explore Weather Trends

Contents

1. Data Extraction

1. SQL Query to find a list of cities of India in the city_list table

```
select  city  from city_list where country ='India';
```

2. SQL query to extract the city level data from city_data table and export to CSV.

```
select year ,avg_temp as city_temp from city_data where city ='Bangalore';
```

3. SQL query to extract the global level data from global_data table and export to CSV.

```
select  year, avg_temp as global_temp  from global_data ;
```

2. Data Cleaning

- Data Exploration – Bangalore

```
select max(year) max_year,
min(year) as min_year,
min(avg_temp) as min_avg_temp,
max(avg_temp) as max_avg_temp,
count(avg_temp) as non_null_avg_temp,
count(*) as tot_yr
from city_data
where city ='Bangalore'
```

max_year	min_year	min_avg_temp	max_avg_temp	non_null_avg_temp	tot_yr
2013	1796	23.30	26.61	211	218

Following are the observations from city (Bangalore) data:

1. There are total 218 years but data is available only for 211 years hence data is missing for 7 years.
2. Minimum temperature of Bangalore is 23.30 and maximum temperature is 26.61.
3. Data of Bangalore is available from 1796 to 2013 years.

- Data Exploration – Global

```
1  select max(year) max_year,
2  min(year) as min_year,
3  min(avg_temp) as min_avg_temp,
4  max(avg_temp) as max_avg_temp,
5  count(avg_temp) as non_null_avg_temp,
6  count(*) as tot_yr
7  from global_data;
```

max_year	min_year	min_avg_temp	max_avg_temp	non_null_avg_temp	tot_yr
2015	1750	5.78	9.83	266	266

Following are the observations from global data:

1. There are total 266 years and data is available for 266 years hence no data is missing.
2. Minimum temperature is 5.78 and maximum temperature is 9.83.
3. Data is available from 1750 to 2015 years.

- Merging the city data and global data to plot the moving average.

```
select a.year,b.avg_temp as city_temp,
a.avg_temp as global_temp
from global_data a
full outer join (select *
             from city_data
             where city ='Bangalore') b
on a.year =b.year
order by year;
```

Output 266 results

year	city_temp	global_temp
1750		8.72
1751		7.98
1752		5.78
1753		8.39
1754		8.47

- Filtering the data where both city and global data is available.

```
select a.year,b.avg_temp as city_temp,
a.avg_temp as global_temp
from global_data a
inner join (select *
             from city_data
             where city ='Bangalore')b
on a.year =b.year
where b.avg_temp is not null
```

Output 211 results

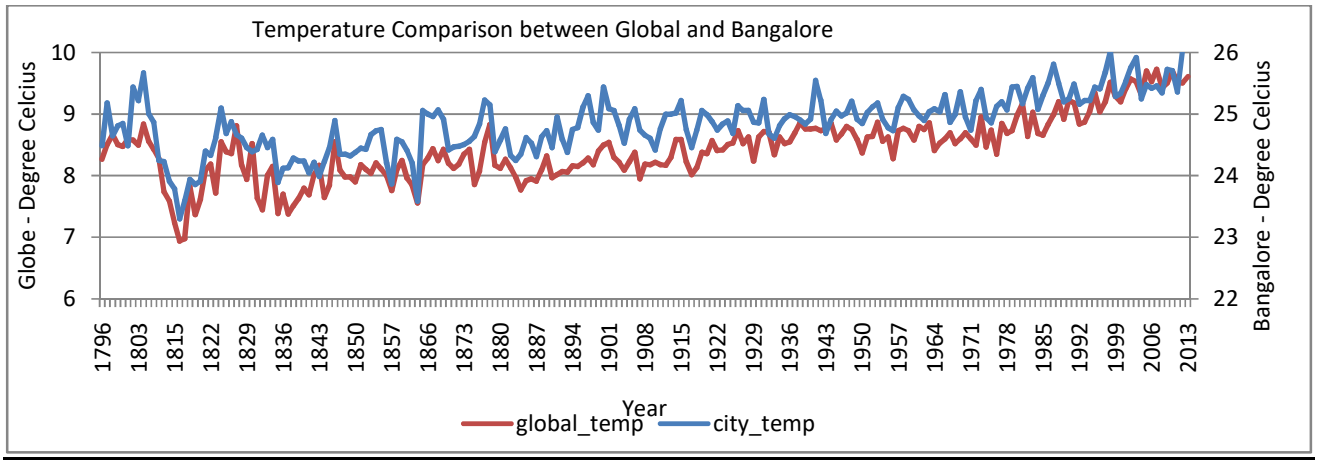
year	city_temp	global_temp
1796	24.49	8.27
1797	25.18	8.51
1798	24.65	8.67
1799	24.81	8.51
1800	24.85	8.48

3. Data Visualisation

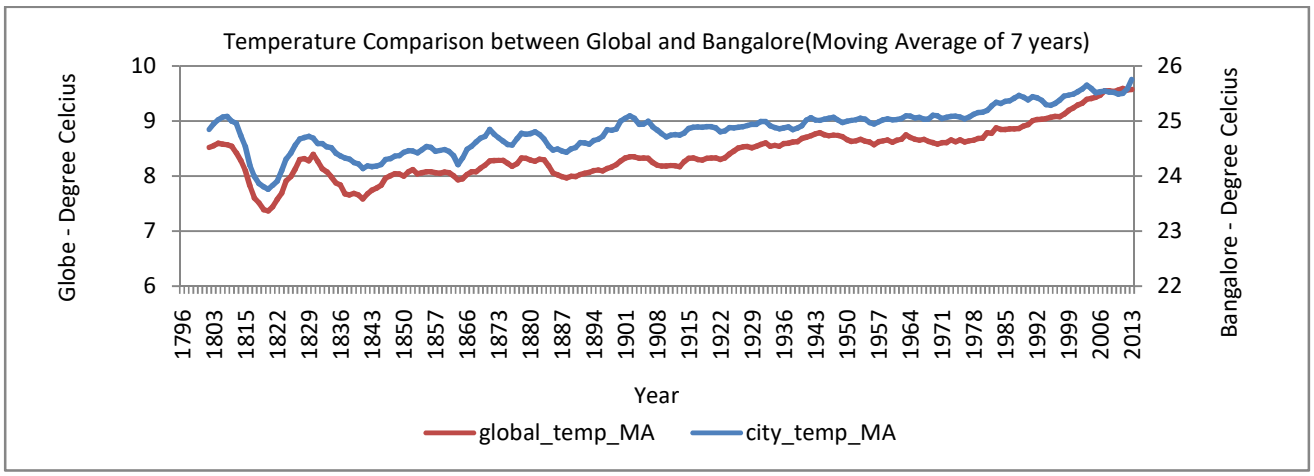
- Sample data calculating moving average of 7 years.

Year	city_temp	global_temp	city_temp_MA	global_temp_MA
1796	24.49	8.27		
1797	25.18	8.51		
1798	24.65	8.67		
1799	24.81	8.51		
1800	24.85	8.48		
1801	24.49	8.59		
1802	25.44	8.58	24.84	8.52
1803	25.22	8.5	24.95	8.55
1804	25.67	8.84	25.02	8.60
1805	25.01	8.56	25.07	8.58
1806	24.87	8.43	25.08	8.57
1807	24.25	8.28	24.99	8.54
1813	24.23	7.74	24.96	8.42
1814	23.91	7.59	24.74	8.28

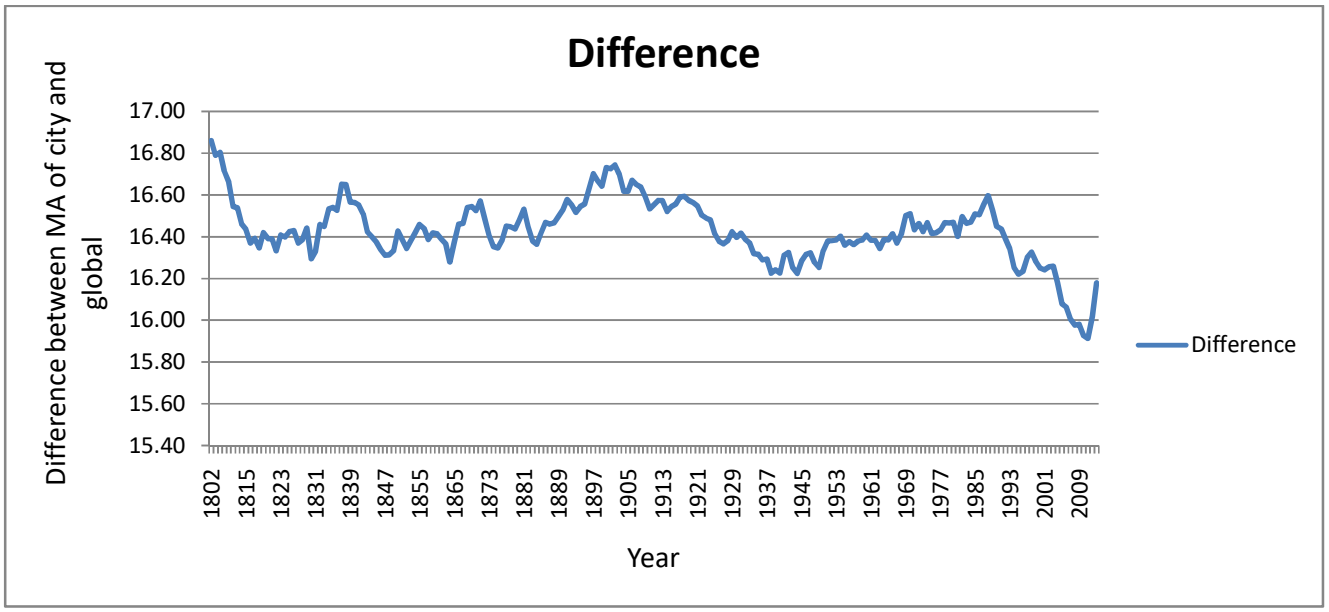
Line chart comparing Bangalore's temperature with global temperature



Line chart comparing Bangalore's temperature with global temperature (Moving average of 7 years)



Line chart plotting difference between MA of city and global with year



4. Observations

- Bangalore is hotter on average compared to global average.
- Moving average difference is not varying much over years. Maximum difference between world and Bangalore is ~16.86 on 1802.
- Both Bangalore's temperature and global temperature trends are same.
- Temperature of both the Bangalore and global are steadily increasing over years i.e. both are getting hotter. Over the last hundred years, there is an approx. 1 degree increase in global and Bangalore temperature.
- World and Bangalore recorded the lowest temperature around 1820.
- Following is the statistics of the two sets of temperature:

	Global_MA_temp	Bangalore_MA_temp
Mean	8.42	24.85
Median	8.33	24.88
Mode	8.08	24.53
Standard Deviation	0.46	0.40
Sample variance	0.21	0.16

- Following is the correlation between two sets of temperature:

Correlation between Global and Bangalore Temperature	0.946514

- Minimum temperature of Bangalore is 23.3 on 1816 (earlier year) and maximum is 26.61 on 2013 (later year).Minimum temperature of world is 5.78 on 1752 (earlier year) and maximum is 9.83 on 2015 (later year).