Exploring Temperature Trends

Cities I've lived in vs global trends since mid-18th century

Steve Zimmers - September 15, 2017

Introduction

For the project Explore Weather Trends for Udacity's Data Analyst nanodegree program, I decided to examine the temperature trends in Chicago, IL (US) and Toronto, ON (Canada), and against global temperature trends.

Chicago and Toronto are often compared to one another in a variety of ways, including weather. Plus, I have lived in both cities and experienced a wide range of temperatures in each.

Approach

Using SQL and csv export, I extracted the relevant data from Udacity's provided database and imported the data into Apple's Numbers application. I used Numbers to create a 2d line chart, determine the moving average, and plot the results.

Details

First, I had to find the city information related to Chicago and Toronto. I used SQL to do this:

```
select * from city_list where city like 'Tor%' or city like 'Chi%'
```

This gave me the values "Toronto" and "Chicago", allowing me to extract the city data like this:

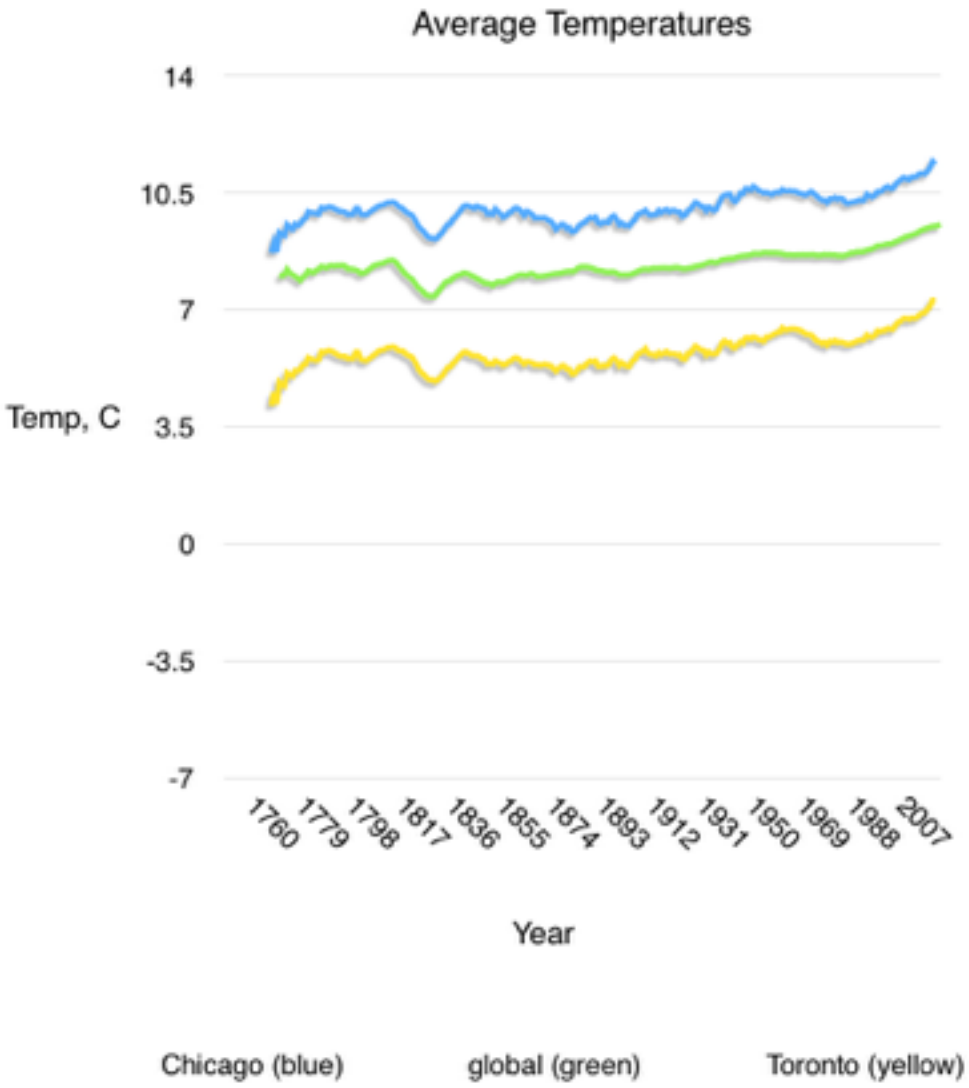
```
select * from city_data where city = 'Toronto'
select * from city_data where city = 'Chicago'
```

I then retrieved the global temperature data like this:

```
select * from global_data
```

After importing the data into Numbers, including correctly lining up the data against the years since the global temperature data had a different year range, I created a 2d Line chart and used all the temperature data in the chart. Numbers provides its own moving

averages functionality, so I used that and specified a period of 15 years for the moving average. I felt that value provided the most informative smoothing: less was too noisy, and more started disguising the trends.



Findings

The first thing I noticed was the temperature trends, though differing in magnitude, roughly followed the same trends. The trends from the earliest years until the mid 19 century reflect temperatures from the Little Ice Age (1).

The second thing I noticed was the increase in temperatures, across all 3 trend lines, from then until present day, possibly reflecting the influence of the industrial age and climate change on global temperatures.

In comparing Chicago and Toronto specifically, though again there are differences in magnitude (Chicago being warmer than Toronto on average), the trends are more similar to one another than they are to the global temperatures. This is possibly due to their proximity (approximately 800km) and sharing similar latitudes. Interestingly, they are both located on the shores of the Great Lakes, though Chicago has a lake to its east (Lake Michigan), and Toronto to its south (Lake Ontario). It was further interesting to me that the global temperatures were between those of Toronto and Chicago.

The final observation is that, though the underlying data reflects some years of average temperatures below freezing (e.g. Toronto in 1752), the trend lines are all above freezing.

1. https://en.wikipedia.org/wiki/Little_Ice_Age