Growing Degree Days - Project

A. Naveen, C. Chagas, A. Iyer, O. Abramov, E. Kielley, R. Brecht

June 7, 2017

Contents

1 Motivation

We want to use Python and Bash scripts to analyse growing degree days for cities in Canada. Growing degree days are used to predict when a flower or plant will bloom.

2 Minimum core tasks

2.1 Files and Scripts

gdd.py

Input: tbase, tupper, input_folder (optional)

Output: year_cityName_tbase_tupper_gdd.csv

Searches for files that ends with *temp.csv*. We expect, that these files have the columns: Date/Time, Min Temp(°C), Max Temp(°C).

Then these columns of each file will be copied into a new csv file with the name *year_cityName_tbase_tupper_gdd.csv*, where cityName is extracted of the current file name. That file will be saved in the folder *Output*. After that, a column called GDD will be added. The value of cell n is calculated with the formula:

$$\sum_{i=1}^{n} \left(\frac{\text{tmax}_i + \text{tmin}_i}{2} - \text{tbase}\right)$$

If tmax_i or tmax_i is bigger than tupper it is set to tupper, also if tmin_i or tmax_i is smaller than tbase then it is set to tbase.

create_plots.py

Output: CumulativeGDD.png, CompareMaxMinTemp.png

Searches for files ending with *gdd.csv*. Then reads of each file the max and min temperature column and creatas a subplot showing the time line of the max and min temperature. Also reads the GDD column and adds accumulated GDD to another figure. Finally saves the two created figures as PNG-files in the *Plot* folder.

2.2 Process flow

The following diagramm shows the dependencies and execution steps of the scripts we are running.

By executing the *Makefile*, we create a folder called *Output* and run the

python script *gdd.py* with the arguments tbase=10, tupper=30 and the path *./Input/*. This produces 3 csv files, because we have 3 files of the format *year_cityName_.csv* in the folder *Input*. Next the script *create_plots.py* is called by Makefile and produces 2 PNG- files. Finally Makefile creates the file *report.pdf* by compiling the *report.tex* file.

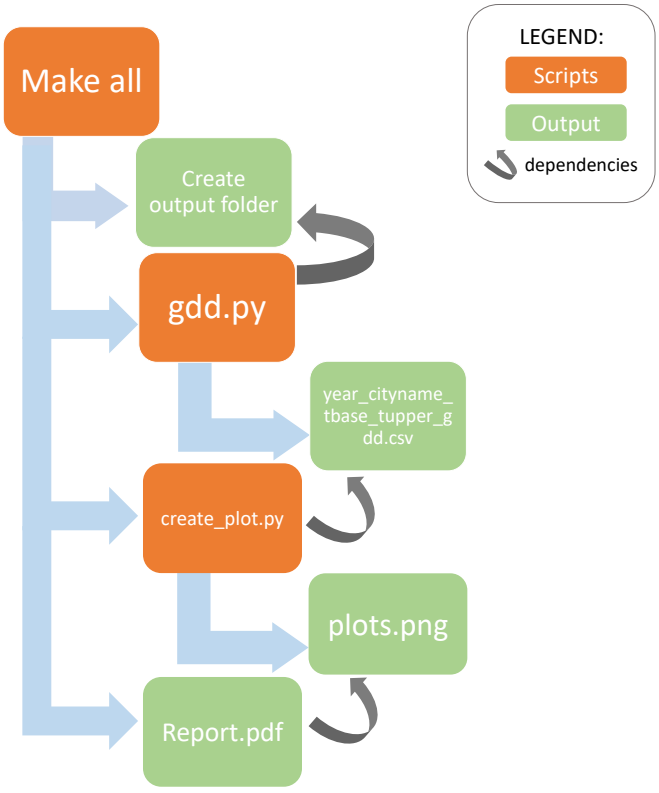

Figure 1: Shows the process flow of our scirpts.

2.3 Results

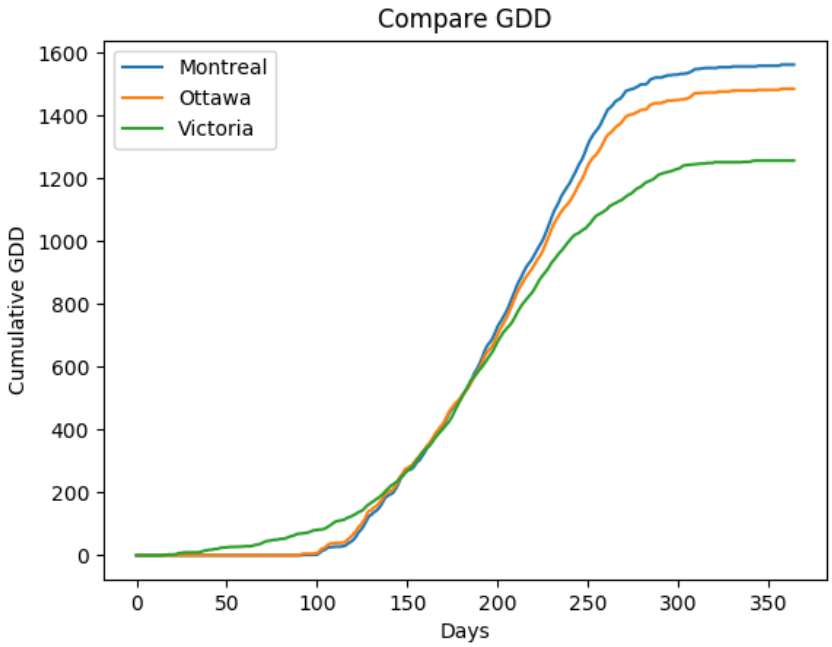

Figure 2: Shows the accumulated GDD vs time for three selected cities.

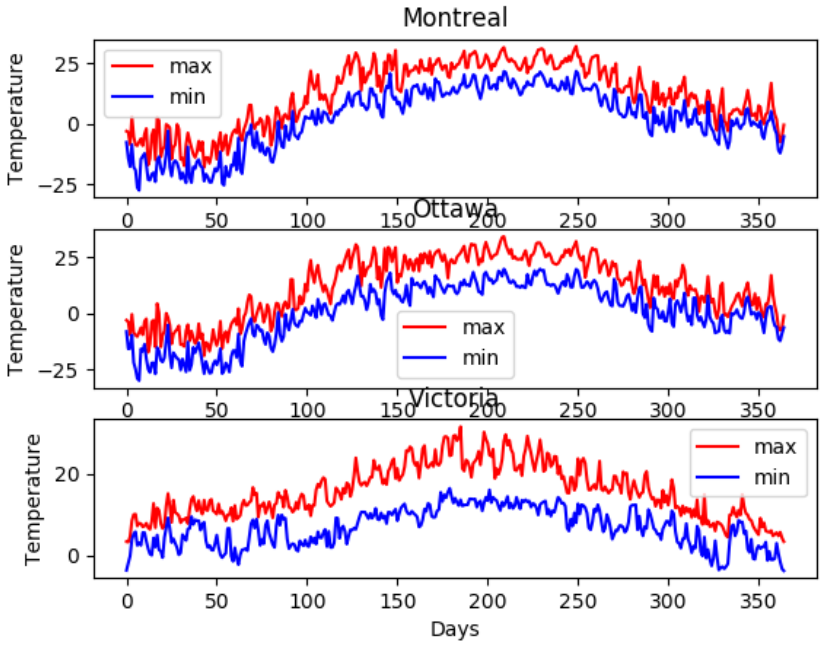

Figure 3: Shows the min and max temperature for three selected cities.

3 Secondary tasks