COMP 125, Fall 2021

Homework Assignment 4

Due: 23:59, January 5 (Wednesday), 2021

In this homework assignment, you will work on csv files. First download the tr_cities.csv file that we put on Blackboard. This is a file downloaded from https://simplemaps.com/data/tr-cities. It contains a list of selected cities in Turkey. After the header row, each row includes information about a particular city. Among those, you will use the following to implement this assignment:

1. The first column (city) is the city name.
2. The second (lat) and third (lng) columns are the latitude and the longitude of this city, respectively.
3. The seventh column (type) indicates whether it is the capital city, an administrative city (in Turkish, İL), or a minor city/town (in Turkish, İLÇE or KASABA) belonging to an administrative city.
4. The sixth column (admin_name) indicates the name of the administrative city that this city belongs to.
5. The eighth column (population) is the population of this city. Note that for some small towns, this population information is not available; check the last rows of the file.

Now implement a program that reads a csv file, creates a dictionary of administrative cities according to the explanations given below, and writes this dictionary into another csv file. This program also displays the capital city as well as the most eastern, most western, most northern, and most southern cities on the screen. Please read the following carefully before starting your implementation.

- Take the input filename from the user. Check whether a file with this name exists or not. If not, give a warning message (check the example output given below). Note that tr_cities.csv is just an example file. We may run your program on other files with a similar format, that is, we may use other files that contain different values in its rows but have the same columns.
- Create a dictionary of administrative cities, of course also including the capital city, for which the key is the administrative city name. There are two values for an item in the dictionary:
    1) Number of capital/administrative/minor cities that this administrative city has (this number should also include the administrative city itself), and
    2) Total population of this administrative city, including the populations of all cities that belong to this administrative city. Note that for some small towns, the population information is not available. Thus, do not include such cities in calculating the total population.
- Write this dictionary into another csv file. Also take the name of this output file from the user. This file should have a header row as given below. After that, each row should have three columns containing the "Administrative City", "Number of Its Cities/Towns", "Total Population", respectively. The first five rows of this output file created for tr_cities.csv are given below. Of course, this output file will contain more lines.

Administrative City	Number of Its Cities/Towns	Total Population
İstanbul	20	15154000
Ankara	40	5751356
İzmir	46	5708368
Bursa	27	3169551
Antalya	34	2888632

- Display the capital city as well as the most eastern, most western, most northern, and most southern cities on the screen (check the example output given below). To find the most eastern and most western cities, use the longitude information. To find the most northern and most southern cities, use the latitude information.

  Below are example runs. The first five rows of the output file, called city_summary.csv, are given above. Of course, this output file will contain more lines.

```
In [1]: runfile('/Users/hw4/hw4.py', wdir='/Users/hw4')

Enter an input filename: my_cities.csv
my_cities.csv does not exist

In [1]: runfile('/Users/hw4/hw4.py', wdir='/Users/hw4')

Enter an input filename: tr_cities.csv
Capital city:  Ankara
Most eastern city:  Esendere
Most western city:  Gokceada
Most northern city:  Sinop
Most southern city:  Yayladagi

Enter an output filename: city_summary.csv
Cities are saved
```

WHAT TO SUBMIT?

This homework assignment asks you to submit only one file whose name must be **`your_student_id.py`**. Use your own student id to give a name to this file. This file should also contain a function called **`main()`** and a call to this main function.

Like the previous homework assignments, the correctness of your program will affect your grade. However, in addition to this, the following points are important to get full credit.

- You MUST use meaningful names for the variables.
- You MUST write explanatory and clearly understandable comments.
- At the beginning of each file, you MUST write your name, your id, and your section as comments. After these, you MUST provide a very brief description about what the program does as additional comments.

For this assignment, you are allowed to use the codes given in the recommended textbooks and/or our lecture slides. However, you ARE NOT ALLOWED to use any codes from other sources (including the codes given in other textbooks, found on the Internet, belonging to your classmates, etc.).