CIS 41A - Lab 4: exceptions, OOP, review iterables

Change lab 3 to use OOP and to improve the candy search functionality.

**Input files**

Use the same 2 files from lab 3: candies.txt and state.csv

**Requirement**

The application has 2 modules: candy.py and ui.py

* candy.py contains the class Candy, which stores data from the input files and has the search methods to look up candy data. The Candy class serves as a 'backend' to the lab 4 app, it handles all the data queries but does not interact with the user (no printing to screen, no prompting the user)
* ui.py contains the class UI (user interface), which interacts with the user to let the user look up candy information. The UI class serves as a 'frontend' to the lab 4 app. It does not access the input files or the data storage in memory.

User

UI

Candy

Input files

backend frontend

A. The Candy class (in candy.py) has:

1. *2 class attributes* which are 2 constants to store the 2 input filenames. Use these 2 class attributes instead of hard coding the filenames when accessing the files.
2. An *\_\_init\_\_* method that accepts an optional input argument: the input filename for the candy information.
   * If the input filename is given, use that filename for the candy information
   * If the input filename is not given, use candies.txt for the candy information
   * Read in data from the 2 input files and store them in data structures that are instance attributes.   
     The data structures are the same as in lab 3:
     + A dictionary for looking up state name: {state name : state abbreviation}
     + A dictionary for searching *by state name*: {state abbr : [(candy1,pounds),(candy2,pounds),(candy3,pounds)]}
     + A dictionary for searching *top candies*: {total pounds : candy name}
3. Two methods to support the 2 searches: by state and by top candies (same 2 search options as in lab 3)  
   - These 2 methods return the found data so that the caller can print and format the data.   
   - These 2 methods should not print the data or format the data, that’s the job of the UI object.
4. Other methods as needed.

General notes for the Candy class:

* The Candy object does not print anything to screen and does not prompt the user (all interactions with the user is the job of the UI class)
* For this lab there's no need to save data to an output file, so you can remove the code for saving data.

B. The UI class (in ui.py) has:

1. An *\_\_init\_\_* method that will:
   * Let the user enter an input filename or press the Enter key to use the default input file.
   * If the input file can't be opened, loop back and re-prompt the user until the file open is successful.
   * The UI class should not have to open the file to check whether the file can be opened, accessing files is the job of the Candy object.
   * Create a Candy object that’s an instance attribute and is initialized with all the state and candy data from the input files.
   * Print to screen the number of states and the number of candy names. Note that these 2 numbers come from the Candy object.
2. A *run* method that loops to:

* present the user with a menu to search by state, by candy, or quit (same menu as lab 3)
  + process each type of search by working with the Candy object
  + end the loop when the user chooses to quit

1. A method to ask the user for a state name, then call the Candy object's search by state method to retrieve and print the candy names and number of pounds for the state.   
   - The print format is the same as in Lab 3.  
   - Print an error message if the state name is not valid.
2. A method to ask the user for the limit of top candies by pounds, then call the Candy object's search by candy method, and print all the candies that are in the user’s given top limit.  
   - The print format is the same as in Lab 3.  
   - Print a message for an invalid limit and for a limit that’s larger than the max number of candies (same as Lab 3).
3. Any other method as needed.

C. Handle errors as needed. Here are the possible errors and the corresponding action:

* Input file can't be opened: re-prompt until there is a valid filename. Note that even the default input file can cause file open error if it’s not in the expected location.
* Error with menu choice: print the menu and re-prompt until there is a valid choice
* Invalid state name when searching by state: print a not found message
* Invalid top limit when searching for top candies by total pounds: print an error message
* Top limit is above max number of candies when searching for top candies by pounds: print a message that the max number of candies will be printed

D. At the end of the ui.py module, start the program with these 2 lines of code:

candyData = UI()

candyData.run()

Final Note:

* Don’t forget to put your name at the top of both source files.
* Make sure that only methods of a class can access instance (private) data directly. All other functions should use setter and getter methods to access instance data of a class.

**Sample Output**

User input in green so it's easy to see

Enter input filename or press Enter for default file: bc

file bc not found

Enter input filename or press Enter key for default file: <Enter>

Reading from default candies.txt

50 states, 24 candies

Search data by

s. state

c. candy

q. quit

Enter your choice: s

Enter state name: IOwa

1. M&M's 65,779

2. Reese's Cups 57,821

3. Hershey's Mini Bars 51,729

Search data by

s. state

c. candy

q. quit

Enter your choice: s

Enter state name: lskda

No such state

Search data by

s. state

c. candy

q. quit

Enter your choice: c

Enter top number of candies: 300

Limit is too large, printing 24 max candies

Reese's Cups : 3,548,476

M&M's : 2,788,867

Skittles : 2,568,337

Hot Tamales : 2,293,393

Starburst : 1,770,779

Sour Patch Kids : 1,420,289

Hershey Kisses : 1,157,419

Snickers : 1,129,797

Tootsie Pops : 1,064,383

Candy Corn : 836,092

Hershey's Mini Bars : 832,061

Butterfinger : 688,862

Jolly Ranchers : 577,616

Blow Pops : 283,387

Salt Water Taffy : 277,596

Twix : 209,693

Swedish Fish : 177,654

Milky Way : 174,405

Kit Kat : 135,672

Dubble Bubble Gum : 110,271

Lemonheads : 109,826

3 Musketeers : 91,820

Almond Joy : 44,883

Life Savers : 11,292

Search data by

s. state

c. candy

q. quit

Enter your choice: c

Enter top number of candies: -2

Limit must be at least 1

Search data by

s. state

c. candy

q. quit

Enter your choice: c

Enter top number of candies: 2

Reese's Cups : 3,548,476

M&M's : 2,788,867

Search data by

s. state

c. candy

q. quit

Enter your choice: k

s. state

c. candy

q. quit

Enter your choice: c

Enter top number of candies: a

limit must be a number

Search data by

s. state

c. candy

q. quit

Enter your choice: q