

Exercise: Dictionary Basics

Summary

Practice with basic operations involving dictionaries in Python.

Input Data

One input file is provided, **nato-alphabet.txt**, that provides the standard words used for spelling things verbally using the NATO phonetic alphabet.

Deliverables

There are two deliverables for this assignment: **basics.py** and **nato.py**.

Instructions

A. Script basics.py

The first part of this assignment is to build a script called **basics.py** that does the steps below.

1. Include the line `import json` (shown below) near the top of the file to import the JSON module. JSON is short for JavaScript Object Notation and the `json` module allows complex data objects to be read in or written out in very clear notation. We'll use JSON a lot during the semester.

```
import json
```

2. Create four dictionaries called `ca`, `tx`, `fl`, and `ny`. They will be used to store information about the four US states with the largest populations in 2016. Each dictionary should have three keys: `po` for the state's two-letter postal code, `name` for its name, and `pop` for its population. Use the information below to set the corresponding values for each dictionary:

| name | po | pop |
|------------|----|----------|
| California | CA | 38654206 |
| Florida | FL | 19934451 |
| New York | NY | 19697457 |
| Texas | TX | 26956435 |

To be clear, the data should be coded directly into the script: it is not necessary to store it in a file and then read the file.

3. Print the `ny` dictionary.
4. Now create a list called `state_list` that has one element for each of the state dictionaries. That is, it should consist of the four dictionaries created above: `ca`, `tx`, `fl`, `ny`.
5. Print `state_list`.
6. Now print `state_list` with better formatting using the `dumps()` call from the `json` module as shown below. The name "dumps" is short for "dump (write out) to a string" and the indent parameter says to indent each level of the object being printed by 4 spaces. It will be clearer from the output what it does.

```
print( json.dumps(state_list,indent=4) )
```

If all goes well, it should be very clear that `state_list` is a list with four dictionaries as elements.

7. Add a variable called `uspop` that is equal to 317899153, which was the total population of the states in 2016 (it excludes Washington, DC, Puerto Rico, and other US territories).

8. Print a message `Percent of the US population:` to create a heading for what comes next.
9. Loop through `state_list` using `state` as the loop variable (the variable name following `for` in a for-loop). Within the loop, do the following:
 1. Create variables `name`, `po`, and `pop` that are equal to that state's name, postal code, and population.
 2. Create a variable called `po_str` that is equal to a string formed like this: `"("+po+")"`.
 3. Create a variable called `pct` that is equal to 100 times the ratio of the state's population to `uspop`. Use the `round()` call to round the results to two decimal places.
 4. Print out `name`, `po_str` and `pct` (one line per state). Each line should look something like this:
California (CA) 12.16

B. Script `nato.py`

For the second part of the assignment, build a script called `nato.py` that does the following:

1. Create a variable called `natofile` equal to the string "nato-alphabet.txt".
2. Create an empty dictionary called `to_nato`.
3. Open `natofile`.
4. Loop through the lines of the file doing the following to each line:
 1. Use the `strip()` call to remove leading and trailing blank space;
 2. Use the `lower()` call to convert it all to lower case;
 3. Use `split()` to break the result into a list of words called `words`.
 4. Finally, use element 0 of `words` (the letter) as a dictionary key and set the value of `to_nato` for that key to `words` element 1 (the NATO word).
5. Create a variable called `syr_str` that is equal to "syracuse" and create an empty list called `syr_list`.
6. Use a for-loop to go through the letters in `syr_str`, look each one up in `to_nato`, and then append that word to the end of `syr_list`.
7. Then join `syr_list` with spaces to create `syr_nato` and print out a message with `syr_str`, "is:", `syr_nato`.
8. Create a variable `myname_str` equal to your first name *in lower case*, and then repeat the last couple of steps to translate it into its phonetic alphabet equivalent as `myname_nato` and print out a message like the one for Syracuse. Please note: if your first name has spaces or punctuation you'll need to omit them because the "nato-alphabet.txt" file we're using only has letters: anything else will lead to an error. A more complex script could work around that limitation.

Submitting

Once you're happy with everything and have committed all of the changes to your local repository, please push the changes to GitHub. At that point, you're done: you have submitted your answer.

Tips

- This just scratches the surface of what can be done with dictionaries. They are the most powerful and flexible of Python's core data structures.

- If you know how to define and use functions, you may want to set one up to translate a given string to its NATO equivalent and then print out the result. You could then call the function on `syr_str` and then `my_str` without having any duplicate code.
- The `demo.py` file shows how to build a dictionary of dictionaries, which is more versatile than a list. However, that step is not required for this exercise.