Welcome to CS 205: Part 2
August 25, 2016

Python: A Crash Course

Python is one of the most widely used programming languages, though differs quite a bit other programming languages. Several key ideas about the Python language:

- Commands and delimited the end-of-line *(not by semi-colons)*
- Scope is delimited by colons and then indenting lines *(not by curly braces)*
- Variables do not need to be declared and are implicitly typed, just use new variables without declaring them
- Conditionals and loops don't use parentheses

The following Python program demonstrates some of that syntax:

```
1  num1 = 10
2  num2 = 20
3  if num1 < num2:
4    num1 = num2
5  else:
6    num2 = num1
```

Functions in Python

In Python, functions are declared with **def**, followed by the function definition. For example, the following program finds the maximum value in a list of numbers:

```
1  def findLargestNumber(a):
2    largest = a[0]
3    for value in a:
4      if value > largest:
5        largest = value
6
7    return largest
```

For…in Loops

One of the strongest features in Python is the **for…in** loop, which will loop through every value within the array.

Today's Starting Files

In your workbook directory, run the following commands:

```
git fetch release
git merge release/demo_pokemon master
```

Sample CSV File

Suppose we have a CSV file called **pokemon.csv**:

Name	Type1	Type2
bulbasaur	grass	poison
charmander	fire	none
squirtle	water	none

Table representation of pokemon.csv

```
1  Name,Type1,Type2
2  bulbasaur,grass,poison
3  charmander,fire,none
4  squirtle,water,none
```

File representation of pokemon.csv

Reading a CSV File in Python

We can easily read files in Python using built-in libraries. We will always read CSV files using the following code:

```
1  import csv
2
3  with open("pokemon.csv") as f:
4    reader = csv.DictReader(f)
5    data = [row for row in reader]
```

The above code constructs a variable, **data**, that is a list (array) of dictionaries, where:

- Each element in the list is a row of the CSV file
- Each of these elements in a dictionary, indexable by the Row 1 headers in the CSV file.

Therefore, we can use **a for…in loop** to loop through each row in data and access features about the data. Consider the following program that finds out how many **grass type** Pokemon exist:

```
   # Using Line 1-5 from above, continuing:
6
7  grassCount = 0
8  for row in data:
9    if row["Type1"] == "grass" or row["Type2"] == "grass":
10     grassCount += 1
11
12 print("Total: " + grassCount + " grass type Pokemon")
```

Running Python Scripts
Once you have a Python script file, you can run it on your command line by navigating into the directory with the file and running the following command (this runs pokemon.py):

```
python pokemon.py
```

Puzzle #1: How many grass-type pokemon exist in our data?

Puzzle #2: How many water-type pokemon exist in our data?

Puzzle #3: Are there more grass-type or water-type pokemon?

Puzzle #4:
Create a new Python file in the same directory and modify the code we've used today to find how similar you are to everyone else in the class.

It may be helpful to go through your data twice, first finding your row. Your first loop through the data may be the following:

```
for row in data:
  if row["Name"] == "Wade":
    myrow = row

# At this point, myrow["whatever"] will return my answer
```