

Summer 2021: CSEE5590 – Special Topics

Python_Lesson_2: Object Oriented Python

Lesson Overview:

In this lesson, we will review Object Oriented Python and NumPy package.

Classes are one of the important concepts of Python. Everything in Python is an Object. Classes enable us to encapsulate data, restrict the scope of data members and functions. They help us in reusability by inheritance. We can define the various level of data encapsulation like private, protected and public.

Use Case Description:

1. Inheritance (Bank Account)
2. Multiple Inheritance (Clock and Calendar)
3. NumPy
4. web scraping

Programming elements:

Object Oriented concepts (classes, constructors, inheritance etc.)

Assignmen_2_Part-1 : Object Oriented Python

1. Classes and objects:

Create a class Employee and then do the following:

- a. Create a data member to count the number of Employees.
- b. Create a constructor to initialize:
 - i. id, name, department, salary, balance, and isEmployed=True.
- c. Create the following functions:
 - i. giveRaise: It takes in an integer, which is the percentage of a pay raise.
 - ii. Pay: This should pay the employee once. Their balance should increase by the amount they are paid.
 - iii. Fire: this should remove the employee from the payroll. It should set their payrate to 0, and isEmployed to false. (Note: Retain the records for the employee, just make sure they aren't paid anymore.)
 - iv. sEmployed: a Boolean function that should return if they are employed or not.
- d. Read employee data from **input.txt** to create instances of the Employee class:
 - i. File structure:
 1. **NEW**: keyword to create a new employee following: ID, Name, Department, Salary
 2. **RAISE**: keyword to give raise to a specific employee following: ID, raise_percentage that will change the emp. salary.
 3. **PAY**: keyword to pay all employee once, balance should increase by the amount they are paid (salary).
 4. **FIRE**: Keyword to remove the employee from payroll. Emp. Following is Emp. ID
- e. Create a Fulltime and Parttime Employee class and it should inherit the properties of Employee class.
- f. Create the instances of Fulltime and Parttime Employee class and call their member functions.
- g. Create a function to average salary paid to all employees. Write the average salary paid to the end of output.txt file after printing the total number of employees.

- h. Your program should output data to output.txt with the following format:
 - i. Emp. Name, ID ###, Department:
 - ii. If employed, write out their Salary in this format: Current salary: \$\$\$
 - iii. If NOT employed, you should write out: Not employed with the company.
 - iv. The employee's balance to date: Pay earned to date: \$\$\$
 - v. Add a blank line between employees.
 - vi.
 - vii. Total number of employees: ###
 - viii. Average Salary paid to all employees: \$###

2. Web scraping

Write a simple program that parse a Wiki page mentioned below and follow the instructions:

https://en.wikipedia.org/wiki/Machine_learning

- a. Print out the title of the page
- b. Find all the links in the page ('a' tag)
- c. Iterate over each tag(above) then return the link using attribute "href" using get

3. Numpy

- 1. Using NumPy create random vector of size 15 having only Integers in the range 1-20.
- 2. Reshape the array to 3 by 5
- 3. Print array shape.
- 4. Replace the max in each row by 0
 - a. (You can NOT implement it via for loop. You need to use **np.where, reshape**)
- 5. Extract a diagonal from the array, and save as .npy file format.

Online Submission Guidelines (for Online students):

- 1. Submit your source code and documentation to GitHub and represent the work in a ReadMe file properly (submit your screenshots as well. The screenshot should have both the code and the output)
- 2. Comment your code appropriately
- 3. Video Submission (1 – 3 min video showing the demo of the assignment, with brief voice over on the code explanation)

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