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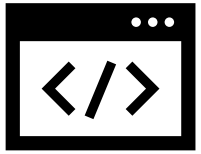

BIOE50010 – Programming 2

Computer Lab 4

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Meme of the week ☺

Source: https://cheezburger.com/13971461/programming-memes-for-frustrated-coders

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What's ahead?

The discussion board is live!

- General questions – we recommend you take advantage of it
- **CW-related questions – SHOULD** be logged on ed discussion
  - No individual inquires (*e.g.*, Teams) will be answered - *fairness* and *efficiency*
  - **Deadline for your CW questions**: 9 a.m. on 9th November (Thursday)

Coursework 1: coming this Friday

- I do not know how it will be… but definitely not GPT compatible.
- What I do think is important… **(1)** lectures and labs; **(2)** clear code, follow the *rule of thumb*; and **(3)** good understanding to the task.
- Have you thought of using a *cheat sheet*?

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Good Coding Practice

> *"Code is read much more often than it is written. Code should always be written in a way that promotes readability."*
>
> ***- Guido van Rossum***

1. Use *intention-revealing*, *descriptive* names

✗ `myList`, `a`, `value1`, `data`: noisy and vague!

✓

variables	`colSeq`	*lower camel case*
functions	`displayBoard`	*lower camel case*
	`display_board`	*snake case*
classes	`BioengPerson`	*upper camel case*
constants	`MAX_CAPACITY`	*constant case*

2. Proper lay out – alignment

Example

```
fcn_name ( var_one, var_two,
           var_three, var_four)

board = [[1, 2, 3],
         [4, 5, 6],
         [7, 8, 9]]
```

3. Good comments do not excuse unclear code; comments are not meant to be cliché.

Read PEP 8 (style guide for Python code) - https://peps.python.org/pep-0008/#programming-recommendations

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docstrings

```
def convert_tensor_to_array(image: torch.Tensor) -> np.ndarray:
    """Converts an iamge tensor to an image array.

    Converts an image tensor to an image array after:
        (1) shrinking the first 2 dimensions
        (2) moving the tensor to CPU
        (3) detaching the tensor from the graph
        (4) converting the tensor to an array

    This utility function could be applied to image tensors
    on arbitrary devices.

    Args:
        image:
            A torch.Tensor that contains pixel values of
            the image.

    Returns:
        A numpy.ndarray that contains pixel values of the
        image.
    """
    return image[0, 0].cpu().detach().numpy()
```

Function descriptions:
- what does it do?
- prerequisite steps
- usage

Function arguments:
what do they do?

Function returns:
what do they do?

By courtesy W. Luo, source code for ISBI 2023 conference: Is Autoencoder Truly Applicable for 3D CT Super-Resolution?

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Shout your questions from Lab 3 !

***Your self-checklist**: have you encountered…*

- ***Data types:*** **`str`**, **`int`**, ***high-dimensional*** **`list`**
- ***Function definition*** *and* ***return*** *and* ***non-keyword arguments***
- ***Formatting with f-string***
- ***Python build in functions:*** `range()`, `enumerate()`

Object-Oriented Programming

Cookie cutter

Cookies

A ***cookie cutter*** can be used to make several ***cookies***.

⇕

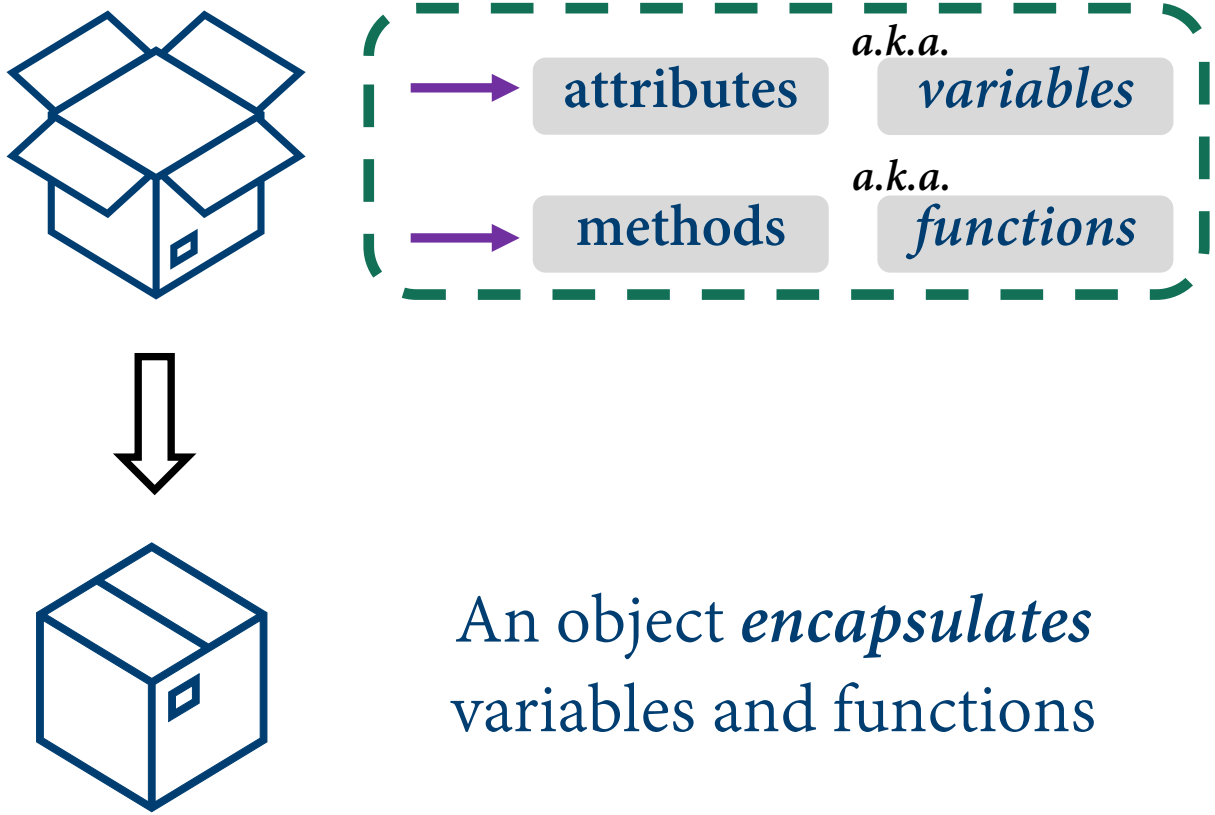
A ***class*** can be used to make several ***objects***.

… is a collection of

- data (***attributes***)
- procedures (***methods***)

Source: Starting Out with Python, 4th Ed.

What's inside an object?



An object ***encapsulates*** variables and functions

Example

```
class Person():
      def __init__(self,fname,lname):
            self.fname = fname;
            self.lname = lname;

      def printName(self):
            print(f'FName: \t{self.fname}')
            print(f'LName: \t{self.lname}')

stu1 = Person('B', 'Li');
stu1.printName();
```

Console

```
FName:   B
LName:   Li
```

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Your task today

- Manipulation on Euclidian coordinates in an *object-oriented* fashion.
  - Define a Euclidian coordinate
  - Print out the coordinate
  - Euclidian to polar conversion
  - Addition, subtraction, multiplication…
- Read the sample code and console output carefully before you start.
- **Hint**: python built-in function `isinstance(`*`object, type`*`)` checks whether (true/false) the specified object is of the specified type.

Example

```
fruit = ['watermelon', 'durian']
print(isinstance(fruit, list))
print(isinstance(fruit, int))
```

Console

```
True
False
```

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Questions?

That's it for now.

You may now proceed to the Lab 4 exercises.