

"Algorithmics and computer programming" - Lab 1

The lab sessions ("TP") of this course will be dedicated to building program that generates eco-responsible meals, based on real nutritional and ecological data. Today, we will start why the nutritional part.

Exercise 1 : Computing daily nutritional requirements

- 1.1 Start a basic text editor you like (suggestions: SublimeText, Atom, Notepad++). Write the code and the docstring of a function that computes the basal metabolic rate, in kcal, of a person according to Mifflin St Jeor's equation.
- 1.2 Write a main program that performs unit tests¹ on this function. Save your file.

A unit test is a call to a function followed by a comparison with the expected result. A successful unit test prints "True". Examples :

```
print(myFunctionReturningAString("Hello world") == "world")
print(myFunctionReturningAnInt(12, 47) == 813)
print(approxEqual(myFunctionReturningAFloat(67.6, 46.2, -3.8), 36.58, 1e-7, 1e-15)) # cf ex. 3 of Lecture 1
```

- 1.3 Start a terminal and navigate to the folder containing your script (`cd path/to/script/folder`). Then run your script by typing `python3 nameofthescript.py`.
- 1.4 Write the code, docstring and unit tests of a function that computes the daily energy requirement of a person, which is $k \times \text{basalMetabolicRate}$, with $k = 1.4, 1.6, 1.75, 1.9$ or 2.1 depending on the physical activity level ('sedentary', 'light', 'moderate', 'intense' or 'very intense').

Exercise 2 : Importing and using nutritional data

To assess the ecological impact of food, we will use data from the meta-analysis performed by Poore and Nemecek (Science 2018), that I have augmented with FAO data for the nutritional aspects. You will find the paper and its supplemental data on Moodle. Look at the supplemental data regarding nutritional content (Table 1 augmented with FAO data). How could you read and use these data in your Python program? For example, try to have your program print the number of kcal brought by 100g of tomatoes, or the grams of proteins brought by 60g of rice.

For a computer program, "reading a file" means copying the data from the hard disk (or USB key or...) to the RAM memory. Python provides functions that do this (see for example <https://docs.python.org/3/library/io.html#module-io> for text files, or https://pandas.pydata.org/docs/reference/api/pandas.read_excel.html for Excel files). Internally, these functions call routines from the operating system, here Linux' read routine.

Prepare for next lab

Read Poore and Nemecek's paper.
