2. Interpolation and program structures

Types of errors in programming

Syntax error: A “typing” error in a statement such as

```
for i in range(10)
    print(i)
```

```
  File "<ipython-input-19-7a8a49ad5eea>", line 1
    for i in range(10)
                      ^
SyntaxError: invalid syntax
```

- the colon after range(10): is missing

Runtime error: An error that occurs during execution of the program such as

```
fig, ax = plt.subplots(figsize=(8,5))
ax.plot(myx,slope*myx+intercept,label='fit')
ax.set_xlabel('x (Volume)',fontsize=18)
ax.set_ylabel('y (Extinktion)',fontsize=18)
plt.xticks(fontsize=18)
plt.yticks(fontsize=18)
plt.show()
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-18-d439c2a3dfc1> in <module>
      1 fig, ax = plt.subplots(figsize=(8,5))
----> 2 ax.plot(myx,slope*myx+intercept,label='fit')
      3 ax.set_xlabel('x (Volume)',fontsize=18)
      4 ax.set_ylabel('y (Extinktion)',fontsize=18)
      5 plt.xticks(fontsize=18)

TypeError: can't multiply sequence by non-int of type 'numpy.float64'
```

- elements of lists cannot be used in arithmetic operations

Types of errors in programming

Semantic error: An error in the programmed instructions leading to the wrong result such as

x (in %) = x-value / y-value

- forgetting to multiply by 100 to convert a value into percent

The process of finding programming errors is called debugging
(see https://en.wikipedia.org/wiki/File:H96566k.jpg for the first real bug).

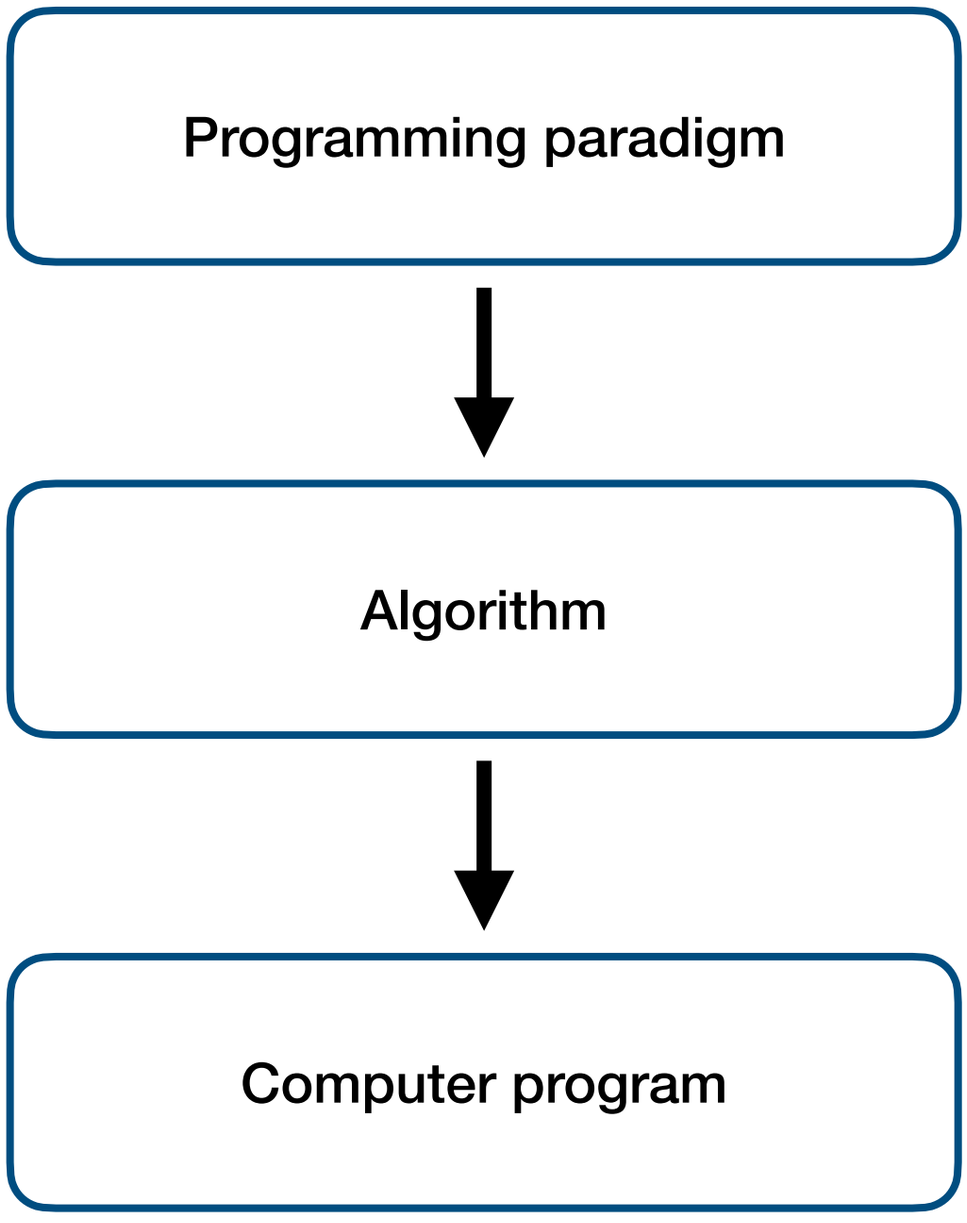
Task 1:

go through the notebook “Problem3”

work out the example: “Problem 3: Best function”

upload your solution to moodle

Program structure

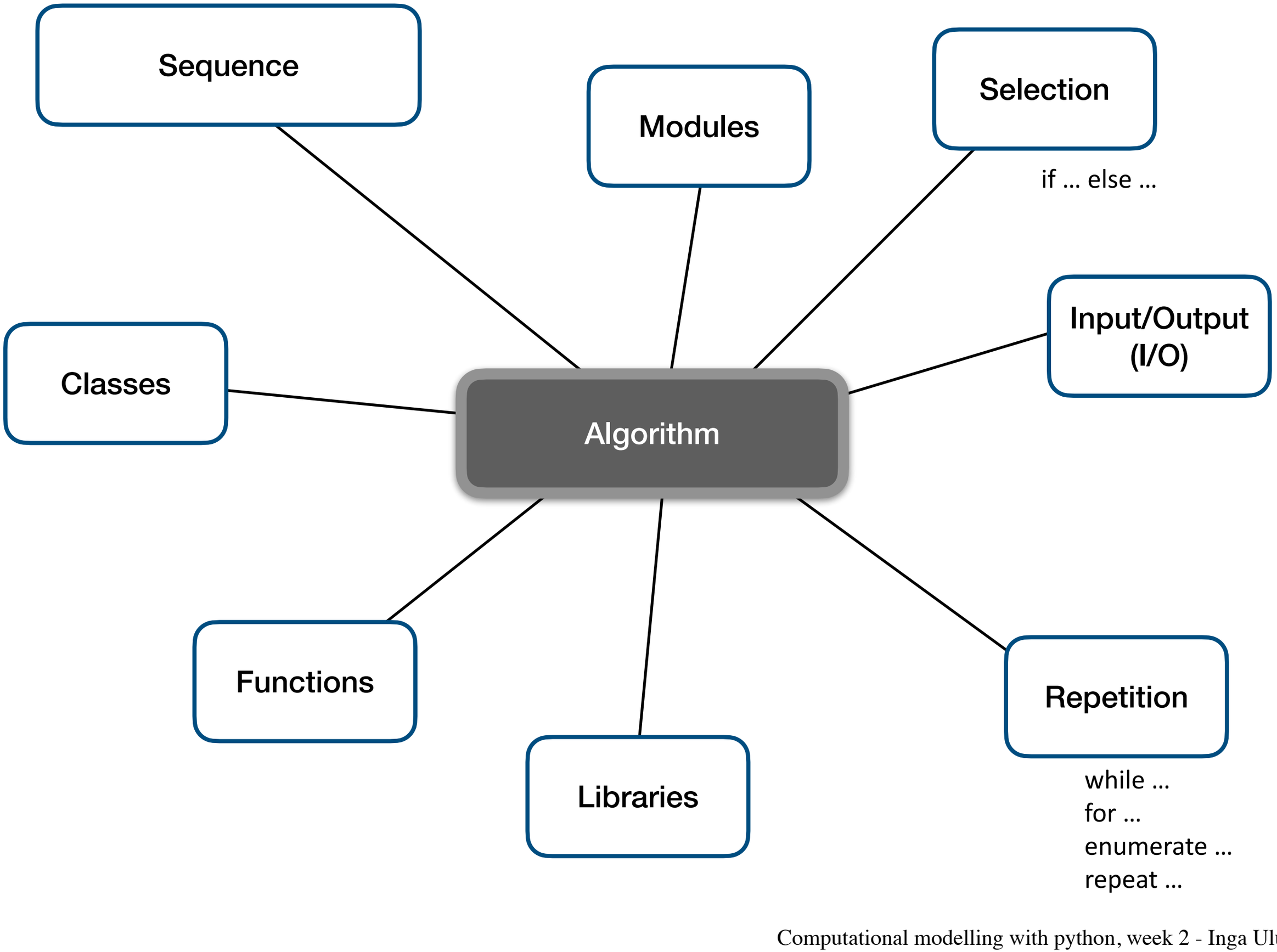


imperative
structural
functional
object-oriented
reflective
…

sequence
precision
uniqueness
…

programming language
platform software
application software
…

Program structure



Task 2:

go through the notebook “Problem4”

work out the example: “Problem 4: Exploring algorithms and program structure”

upload your solution to moodle