Introduction à la vision artificiel

Autor: Cristopher McIntyre Garcia

Introduction

- Courriel: cmcin019@uottawa.ca
- Maitrise en Informatique
- Intérêts:
  - Vision artificiel *
  - Inteligence artificiel *
  - Exemples contradictoires *
  - Réseaux neuronaux graphiques

Objectifs

- C’est quoi la vision artificiel?
- Concept fondamental
- Connaissance pratique
- Explorer la vision artificiel modern
- Créer un intérêt

Technologie

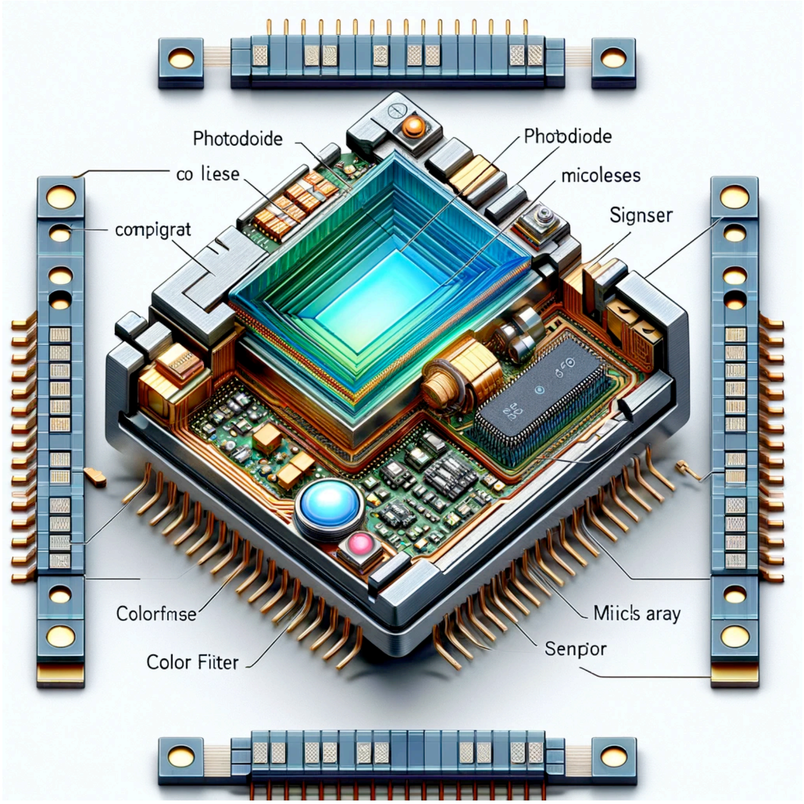
- Python & OpenCV
- PyTorch & Huggingface
- Google Colab
- Github
- Guide d’installation

Mini-Cours

- Jour 1: Introduction à l’image digital
- Jour 2: Techniques de base de la vision artificiel et au traitement d’image
- Jour 3: Filtre et technique traditionnel avancé
- Jour 4: Introduction a l’intelligence artificiel (ML et DL)
- Jour 5: Technique modern - Conversation de nos courent

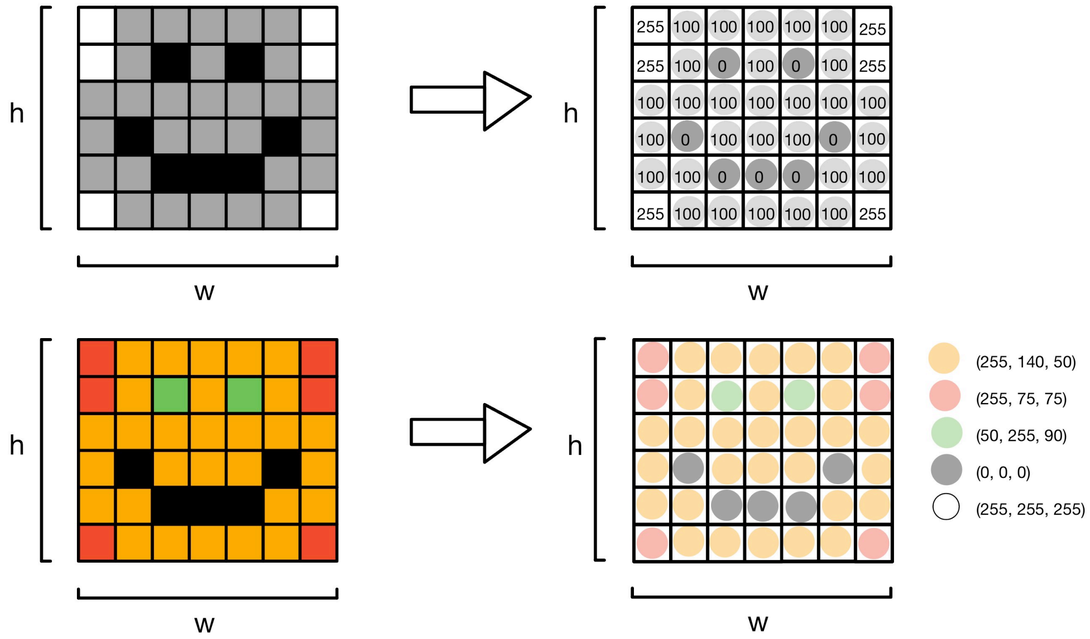
Pourquoi apprendre la vision artificiel

- Véhicules autonome
- Imagerie médical
- Surveillance
- Art artificiel/généré
  - Stable diffusion



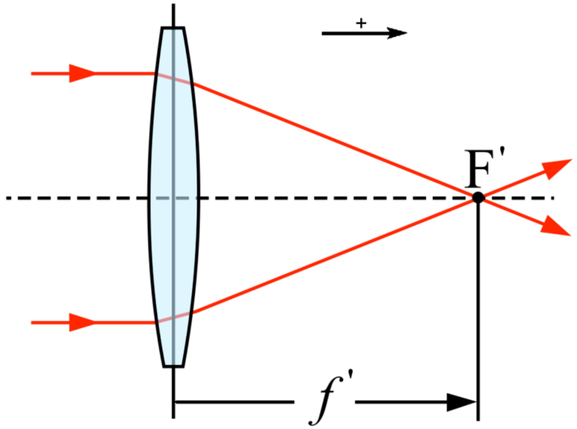
C’est quoi une image?

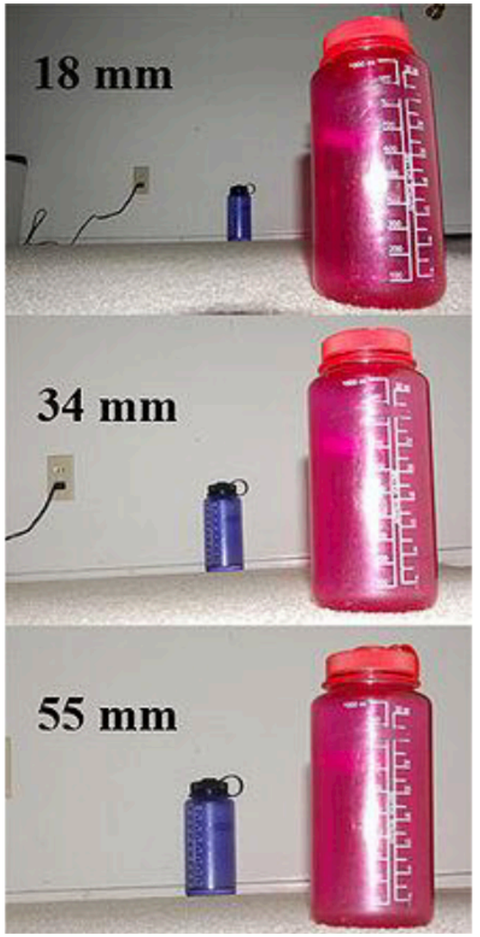
- Pixels (picture elements)
  - Éléments discret qui compose une image
  - Représentes des couleurs et intensité
  - Résolution
- Format: (Hauteur, Largeur, Canal)
  - Ex. (6, 7, 3)

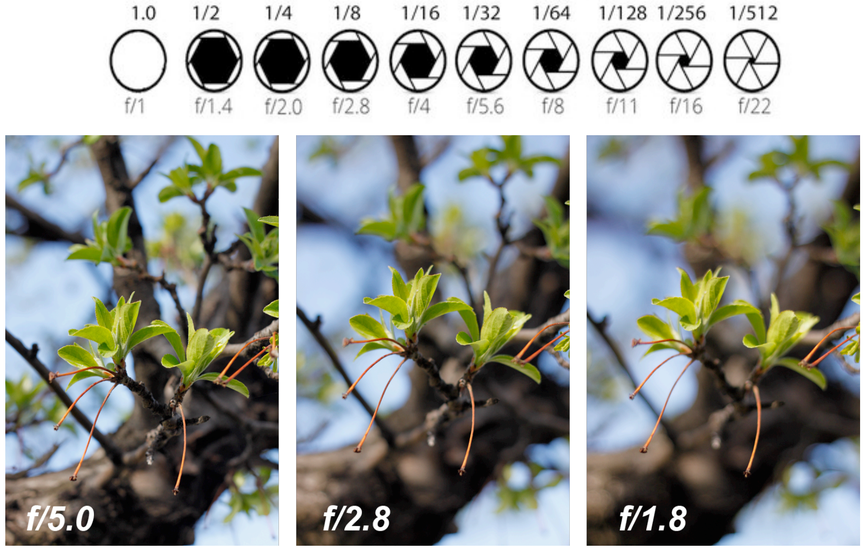


Capturé une image

- Camera
- Paramètres
  - Lentille (normal, wide angle, fisheye)
  - Longueur focale
  - Ouverture maximal
  - F/# (F-number)







Qualité de l’image

- Distortion
  - Tonneau (Barrel)
  - Pincushion
  - Vignettage

Barrel distortion

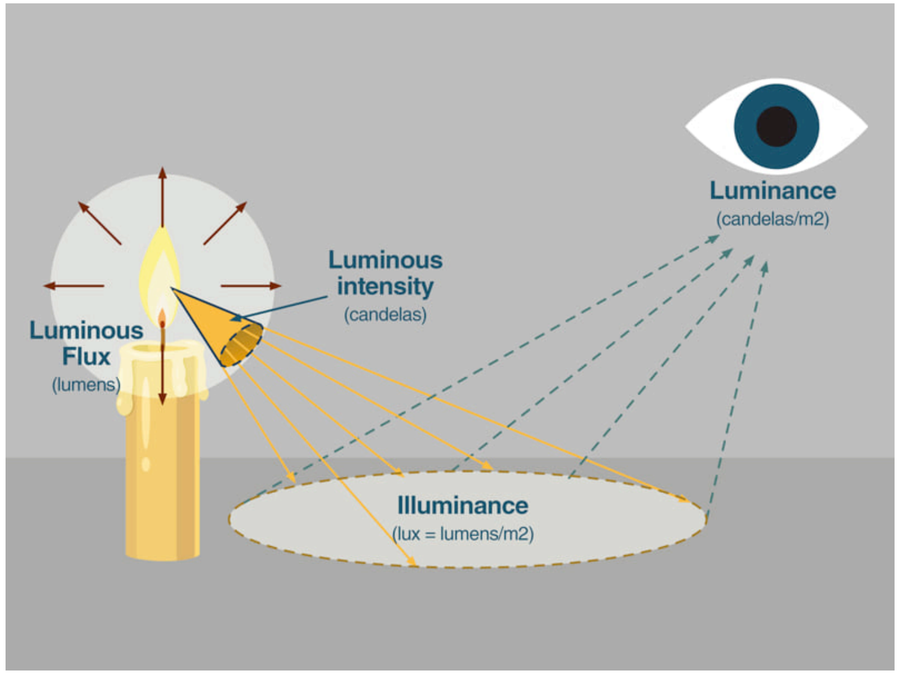
Pincushion Distortion

Qualité de l’image

- Rayonnement (énergie total venant d’une source lumineuse)
- Luminance (énergie observé)
- Luminosité (descripteur subjectif de la perception de lumière)
- Réflectance (fraction de l’énergie rayonnant qui est réfléchie par une surface)

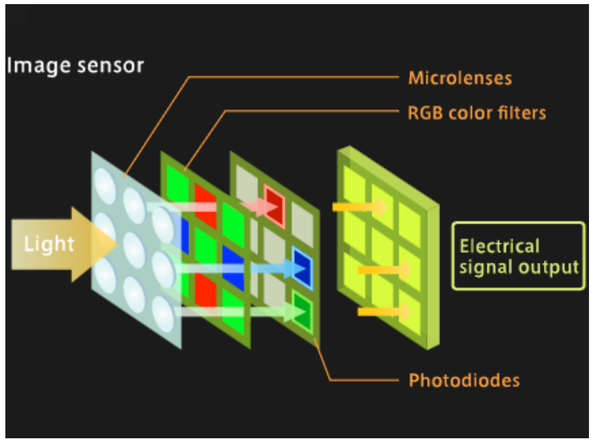
Capturer les images

- Pour capturer une image, la luminance doit être convertie en voltage



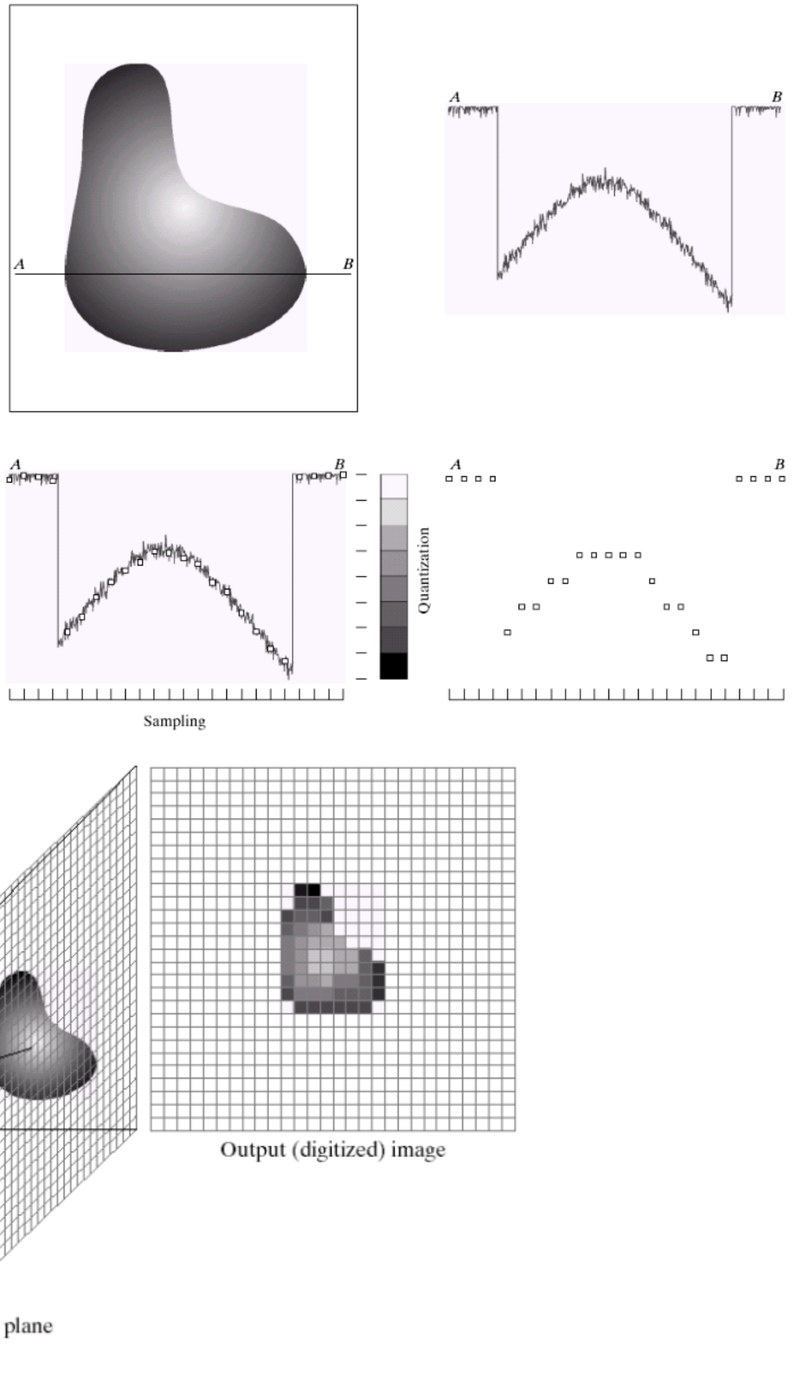
Électroniques pour capturer les images

- Grille de phototransistors
- Detect les intensités lumineuses
  - Charged-coupled device (CCD)
  - Complementary metal-oxide semiconductor (CMOS)

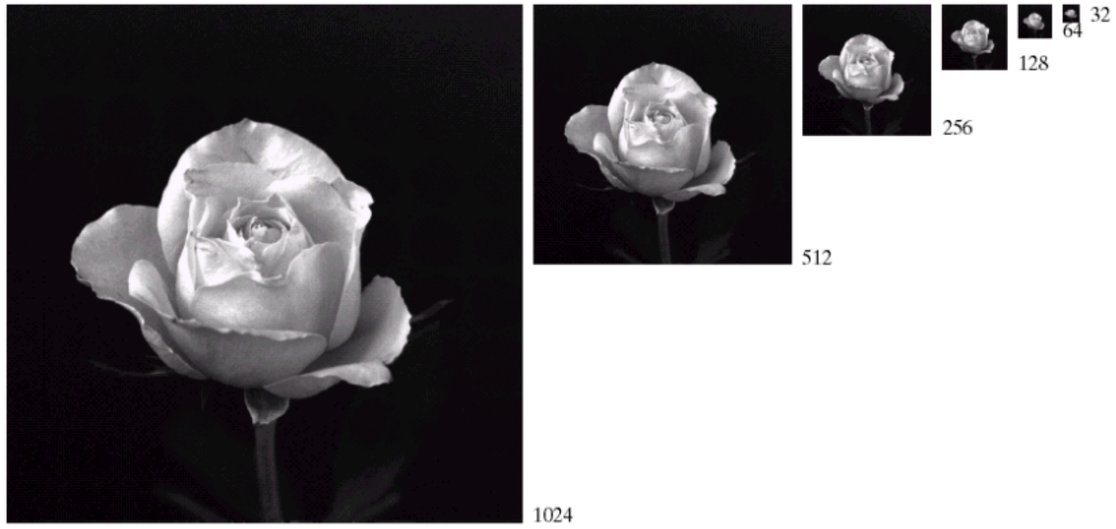


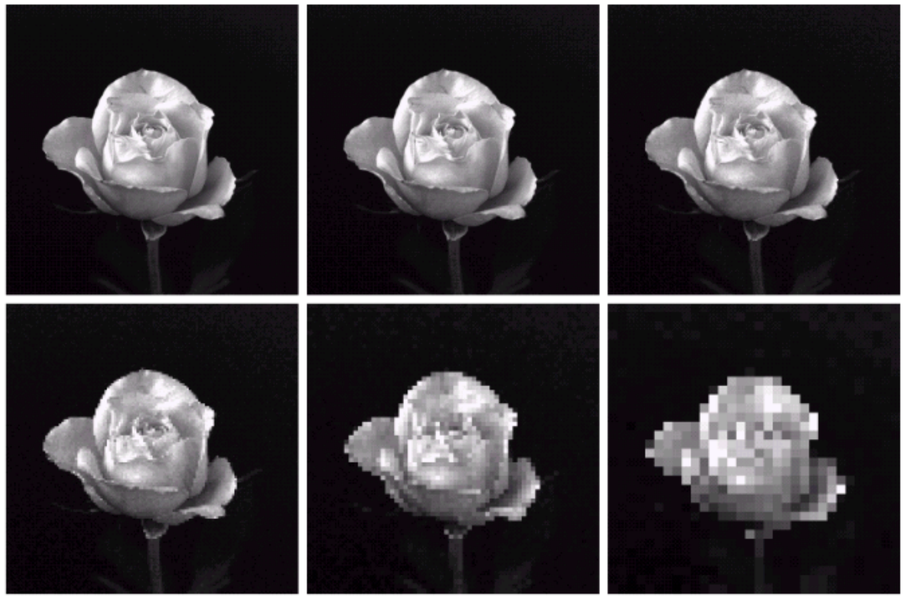
Acquisition d’image

- Échantillonage
  - Séquence de valeurs instantané
- Quantification
  - Convertire en nobre fini



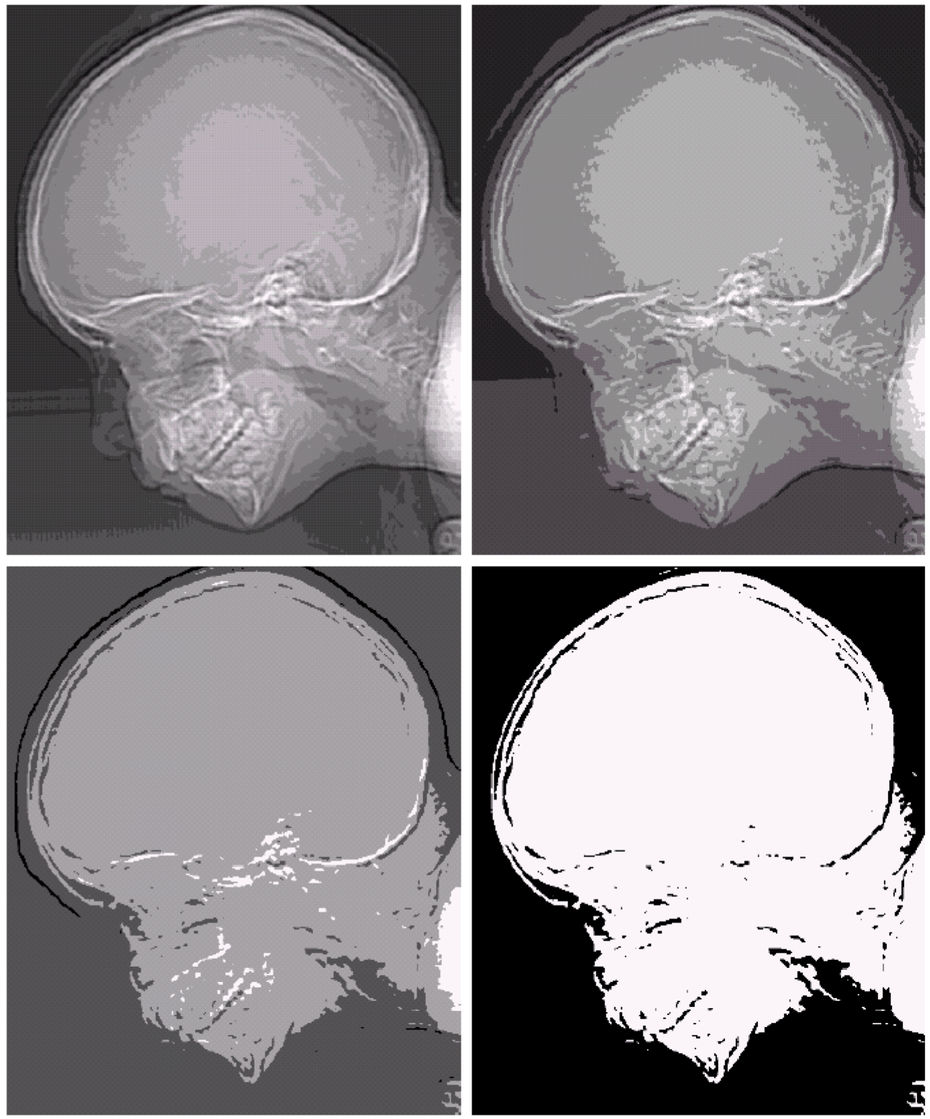
Échantillonage



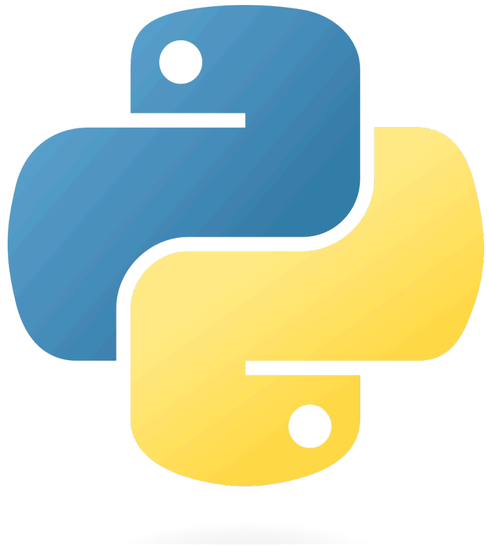


Quantification

- Nombre de niveaux de gris



Introduction a Python



- GitHub
  - https://github.com/cmcin019/mini-cours
- Google Colab
- IDE (Virtual Studio Code)

Syntax et concepts

- Variable
- Type de donné
  - Int, String, Bool, etc
- Operator et expression
  - +, -, *, ==, !=, =, +=, &, ^, etc

```
seconds_in_a_day = 24 * 60 * 60
seconds_in_a_day
```

```
86400
```

```
print(type(1))
print(type(0.))
print(type("bonjour"))
print(type(True))
```

```
<class 'int'>
<class 'float'>
<class 'str'>
<class 'bool'>
```

Structure de donné

- Liste
- Tuple
- Dictionaire
- Sets

- **Lists**('list') - Collections ordonnées et mutables d'éléments.
- **Tuples**('tuple') - Collections ordonnées comme des listes, mais immuables.
- **Dictionaries**('dict') - Collections non ordonnées de paires clé-valeur.
- **Sets**('set') - Collections non ordonnées d'éléments uniques.

```
print(type([1,2,3]))
print(type((1,2,3)))
print(type({'un':1, 'deux':2, 'trois':3}))
print(type({1,2,3}))
```

```
<class 'list'>
<class 'tuple'>
<class 'dict'>
<class 'set'>
```

Structure de control

- Déclaration conditionnelle
  - If, elif, else
- Boucles
  - While, for

```
my_variable = 5
if my_variable < 0:
  print("negative")
elif my_variable == 0:
  print("null")
else: # my_variable > 0
  print("positive")
```

```
positive
```

Boucles while

```
[ ]  i = 0
     while i < len(my_list):
       print(my_list[i])
       i += 1 # equivalent to i = i + 1
```

```
1
2
3
4
```

Boubles for

```
[ ]  for i in range(len(my_list)):
       print(my_list[i])
```

```
1
2
3
4
```

Fonction

- Definition d’une fonction
- Arguments
- Valeur retournée

```
def square(x):
  return x ** 2

def multiply(a, b):
  return a * b

# Functions can be composed.
square(multiply(3, 2))
```

```
36
```

Library

- Import modules
- Module Intégré
  - Math
  - Os

Fin

- Merci