

AI and ML

Basic Python

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Code Structure of Python

匯入函示庫

{

```
import library
import library1 as lib1
from library import sub-library as sublib
```

```
print('Hello World')
```

四個空白

```
for i in range(10):
    print('Hi!')    #印出十次 'Hi!'
```

```
def sayhi():
    print('Hi')
```

```
sayhi()    #呼叫 function sayhi()，印出一次 'Hi'
```

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變數(Variables)

數字 : int, float, long, complex

字串 : string

常見的數值運算

(int, float, long, complex)

```
>>> 1+1
```

```
2
```

```
>>> 1-1
```

```
0
```

```
>>> 2*3
```

```
6
```

```
>>> 2**3
```

```
8
```

```
>>> 100/3
```

```
33.333333333333336
```

```
>>> 100//3 #求整數部份，無條件捨去
```

```
33
```

```
>>> 100%3 #求餘數
```

```
1
```

常見的字串運算與處理

```
>>> a = "Hello!"
>>> b = "World!"
>>> a+b
'Hello!World!'
>>> a*2+b
'Hello!Hello!World!'
>>> len(a) #字串長度
6
```

```
>>> s = "abcdefghij"
>>> s[3:5]
'de'
>>> s[:5]
'abcde'
>>> s[5:]
'fghij'
>>> s[::2]
'acegi'
>>> s[:]
'abcdefghij'
```

```
>>> s = "abcdefghij"
>>> s[: -5]
'abcde'
>>> s[-5:]
'fghij'
>>> s[:: -2]
'jhfdb'
```

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容器(Containers)

- List
- Array
- Dictionary

列表 (List)

```
>>> a = [1, 2, 3]
>>> b = [4, 5]
>>> a.append(b)
>>> a
[1, 2, 3, [4, 5]]
-----
>>> a.extend(b)
>>> a
[1, 2, 3, 4, 5]
```

列表 (List)

```
>>> numbers = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
>>> numbers[3:5]
[3, 4]
>>> numbers[5:]
[5, 6, 7, 8, 9]
>>> numbers[:5]
[0, 1, 2, 3, 4]
>>> numbers[::2]
[0, 2, 4, 6, 8]
>>> numbers[:]
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```


矩陣 (Array)

```
>>> l = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
>>> import numpy as np
>>> a = np.asarray(l)
[0 1 2 3 4 5 6 7 8 9]
```

```
-----
>>> import numpy as np
>>> a = np.arange(10)
[0 1 2 3 4 5 6 7 8 9]
>>> a[0]
0
>>> a[9]
9
```

矩陣 (Array)

因為Python沒有 array 型態，
必須透過上一頁的方法取得
numbers = [0 1 2 3 4 5 6 7 8 9]

```
>>> numbers[3:5]  
[3 4]
```

```
>>> numbers[5:]  
[5 6 7 8 9]
```

```
>>> numbers[:5]  
[0 1 2 3 4]
```

```
>>> numbers[::2]  
[0 2 4 6 8]
```

```
>>> numbers[:]  
[0 1 2 3 4 5 6 7 8 9]
```

字典 (Dictionary)

```
>>> dictionary = { 1: 'one' , 2: 'two' , 3: 'three' }
```

```
>>> square = {0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81}
```

```
>>> square[5]
```

```
25
```

```
>>> square.keys()
```

```
dict_keys([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
```

```
>>> square.values()
```

```
dict_values([0, 1, 4, 9, 16, 25, 36, 49, 64, 81])
```

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迴圈與條件式

- for loop
- if...else...

For 迴圈

```
>>> numbers = []  
>>> for i in range(10):  
        numbers.append(i)
```

```
>>> numbers  
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

#簡寫

```
[i for i in range(10)]  
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

```
>>> square = {number: number**2 for number in range(10)}  
>>> square  
{0: 0, 1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81}
```

進階用法

在 Python 内置了工厂函数，`range` 函数将会返回一个序列，总共有三种使用方法

1 `range(start, stop)`

其中 `start` 将会是序列的起始值，`stop` 为结束值，但是**不包括**该值，类似 数学中的表达 `[start, stop)`，左边为闭区间，右边为开区间。

```
for i in range(1, 10):  
    print(i)
```

上述表达将会返回 `1-9` 所有整数，但不包含 `10`

2 `range(stop)`

如果省略了 `start` 那么将从 `0` 开始，相当于 `range(0, stop)`

3 `range(start, stop, step)`

`step` 代表的为步长，即相隔的两个值得差值。从 `start` 开始，依次增加 `step` 的值，直至等于或者大于 `stop`

```
for i in range(0, 13, 5):  
    print(i)
```

将会输出 `0, 5, 10`。

進階用法

Python 共内置了 `list`、`tuple`、`dict` 和 `set` 四种基本集合，每个 集合对象都能够迭代。

tuple 类型

```
tup = ('python', 2.7, 64)
for i in tup:
    print()
```

程序将以此按行输出 'python', 2.7 和 64。

dictionary 类型

```
dic = {}
dic['lan'] = 'python'
dic['version'] = 2.7
dic['platform'] = 64
for key in dic:
    print(key, dic[key])
```

输出的结果为：`platform 64, lan python, version 2.7`，字典在迭代的过程中将 `key` 作为可迭代的对象返回。注意字典中 `key` 是乱序的，也就是说和插入 的顺序是不一致的。如果想要使用顺序一致的字典，请使用 `collections` 模块 中的 `OrderedDict` 对象。

set 类型

```
s = set(['python', 'python2', 'python3', 'python'])
for item in s:
    print(item)
```

将会输出 `python, python3, python2` set 集合将会去除重复项，注意输出的 结果也不是按照输入的 顺序。

if...else...

```
>>> numbers = []  
>>> for i in range(10):  
    numbers.append(i)
```

```
>>> numbers  
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

#簡寫

```
numbers = [ i for i in range(10) ]  
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
```

```
-----  
for i in range(len(numbers)):  
    if( i == 0 ):  
        print(i, '是奇數也是偶數')  
    elif( i % 2 == 1 ):  
        print( i, '奇數' )  
    else:  
        print( i, '偶數' )
```


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函式與匿名函式

- function
- lambda

function

```
>>> def add(x, y):  
>>>     return x+y
```

```
>>> add(1, 1)
```

2

```
>>> add(1, -3)
```

-2

```
>>> def minus(x, y):  
>>>     return x-y
```

```
>>> minus(1, 1)
```

0

```
>>> minus(1, -3)
```

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lambda

```
>>> add = lambda x, y: x + y  
>>> add(1, -3)  
-2
```

```
>>> newValue = lambda x: -x  
>>> newValue(9)  
-9
```

Print

印出

print 字符串 ¶

python 中 print 字符串 要加"或者"

```
>>> print('hello world')
'''
hello world
'''
>>> print("hello world 2")
'''
hello world 2
'''
```

字符串相加

print 字符串叠加

可以使用 `+` 将两个字符串链接起来, 如以下代码.

```
>>> print('Hello world'+'Hello Hong Kong')  
Hello world Hello Hong Kong
```

基本運算

可以直接 `print` 加法 `+`, 减法 `-`, 乘法 `*`, 除法 `/`. 注意: 字符串不可以直接和数字相加, 否则出现错误。

```
>>> print(1+1)
2
>>> print(3-1)
2
>>> print(3*4)
12
>>> print(12/4)
3.0
>>> print('iphone'+4) #字符串不可以直接和数字相加
Traceback (most recent call last):
  File "<pyshell#10>", line 1, in <module>
    print('iphone'+4)
TypeError: Can't convert 'int' object to str implicitly
```

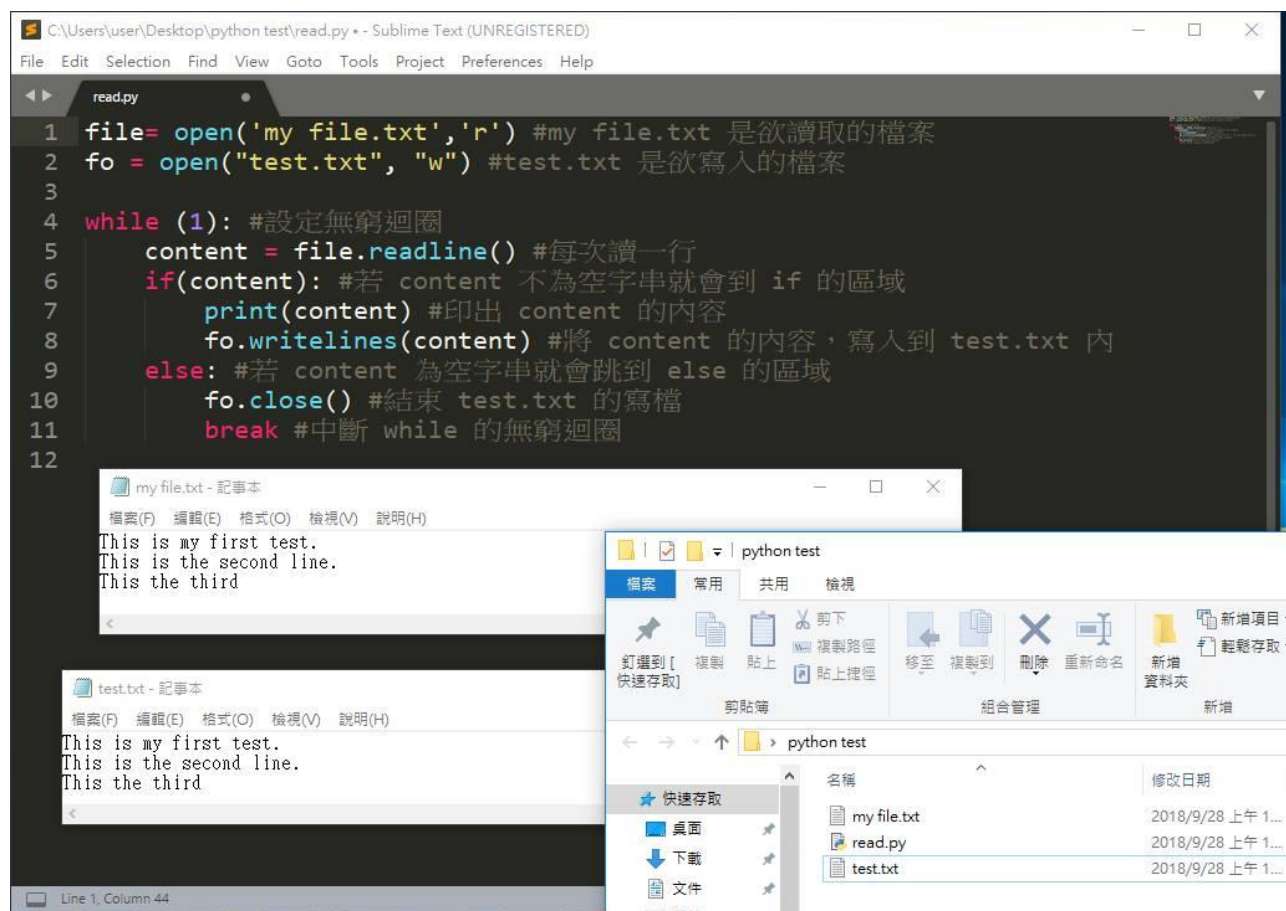
基本運算

`int()` 和 `float()`: 当 `int()` 一个浮点型数时, `int` 会保留整数部分, 比如 `int(1.9)`, 会输出 `1`, 而不是四舍五入。

```
>>> print(int('2')+3) #int为定义整数型
.....
5
.....
>>> print(int(1.9)) #当int一个浮点型数时, int会保留整数部分
.....
1
.....
>>> print(float('1.2')+3) #float()是浮点型, 可以把字符串转换成小数
.....
4.2
.....
```


寫檔讀檔

寫檔讀檔



寫檔讀檔

- `file = open("my file.txt", "r", encoding='utf-8')`
- `fo = open("test.txt", "w", encoding='utf-8')`

Thank you