
Python File (Simple)

臺北科技大學資訊工程系

開啟檔案

❑ `<file> = open(<filename>, <mode>)`

- `<file>`：開啟檔案物件
- `<filename>`：檔名
- `<mode>`：開檔模式
 - `r`: 唯讀
 - `w` (write): 覆蓋寫入內容
 - `a` (append): 在後加入新內容

```
infile = open('hello.txt', 'r') # 以讀取模式開檔  
outfile = open('hello.txt', 'w') # 以寫入模式開檔
```

r	開啟檔案只讀取
rb	開啟檔案只讀取格式為binary
r+	開啟檔案可讀取寫入
rb+	開啟檔案可讀取寫入binary
w	開啟檔案只寫入
w+	可讀取可寫入模式
wb	開啟檔案只寫入二進位格式
a	只允許新增
a+	允許新增與讀取

關閉檔案

❑ `<file>.close()` #將緩衝區內容寫入檔案，關閉檔案

- 檔案讀寫可能產生IOError，而不會呼叫`fp.close()`造成關檔錯誤。
- 為保證是否出錯都正確關閉檔案，可使用`try ... finally`

```
try:
    fp = open('hello.txt', 'r')
    print(fp.read())
    fp.write('test')
except FileNotFoundError:
    print("file not found")
except:
    print("Something wrong")
finally:
    fp.close()
```

❑ 用`with`開檔，若錯誤，檔案仍會自動關閉，錯誤情境：

- 執行`return`, `continue`, `break`跳出`with`指令區塊
- 發生例外 (Exception)

```
with open('hello.txt', 'r') as fp:
```

讀取檔案

- ❑ <file>.read()
 - 讀取全部或剩餘資料，回傳長字串
- ❑ <file>.readline()
 - 讀取下一行資料，回傳字串
 - 利用迴圈一次讀一行資料

```
with open('filename.txt', 'r') as infile:
    while True:
        data = infile.readline() # 一次讀一行資料
        print(type(data))
        print(data)
        if not data:           # 所有資料讀取完畢
            break
        print(line, end="")    # end="": 不要自動加換行
```

讀取檔案

❑ <file>.readlines()

- 讀取全部或剩餘資料，
- 回傳 **串列**，每個元素都是一行資料

```
with open('filename.txt', 'r') as fp:  
    data2 = fp.readlines()  
    print(type(data2))  
    print(data2)
```

```
with open('filename.txt', 'r') as infile:  
    for line in infile.readlines(): # 一次讀取所有資料，再一行一行處理  
        print(line, end="")
```

```
# Python 讀檔將每行資料存到串列中的元素，上述程式可簡化  
with open('filename.txt', 'r') as infile:  
    for line in infile:  
        print(line, end="")
```

寫檔 4 個方法

❑ write

```
# 開啟檔案
fp = open("out.txt", "a")
# 寫入 This is a testing! 到檔案緩衝區
fp.write("This is a testing!")
# 將緩衝區寫入檔案，關閉檔案
fp.close()
```

❑ writelines

```
# 開啟檔案
fp = open("filename.txt", "w")
# 將 lines 所有內容寫入到緩衝區
lines = ["One\n", "Two\n", "Three\n"]
fp.writelines(lines)
# 將緩衝區寫入檔案，關閉檔案
fp.close()
```

❑ print

```
# 開啟檔案
fp = open("out.txt", "a")
# 寫入 This is a testing! 到檔案緩衝區
print("This is a testing!\n", file=fp)
# 將緩衝區寫入檔案，關閉檔案
fp.close()
```

❑ with open

```
text = ["this is ", "a book"]
with open("out.txt", 'a') as out_file:
    for line in text:
        out_file.write(line)
```

Exercise

- 利用迴圈一次讀一行資料，將偶數行資料印出

```
with open('filename.txt', 'r') as infile:
    line_num=0
    for line in :
        line_num+=1
        if line_num%:
            print(line, end="")
```

- 一次讀取、印出多行資料，將全部資料的第一個字與最後一個字印出

```
fp = open('hello.txt', 'w')
fp.write("First line\n#Second line\n#Third")
fp.close()
with open('hello.txt', 'r') as infile:
    data = infile.r
    print(data)
    print(data[0], data[-1])
```

讀寫檔案

- ❑ 顯示檔案所有行，忽略以#開頭的行

```
with open("hello.txt") as f:  
    for line in f:  
        if line.strip()[0] != "#":  
            print(line)
```

- ❑ 把passwd檔案中'root'字串用'west'替換，另存tmp檔案

```
with open("passwd.txt") as f1:  
    # 遍歷檔案的每一行內容；  
    for line in f1:  
        # 字串替換  
        bline = line.replace("root", "west")  
        with open("tmp", "a+") as f2:  
            # 寫入新檔案  
            f2.write(bline)
```

root	word
user	pass

west	word
user	pass

Exercise

- ❑ 讀取English.txt檔案，將其中xi 字串以yi 替換，

I love cat and love dog, but I am afraid of tiger.

- ❑ X, Y 分別存在 translate.txt檔案的第一 row和第二row
 - $X=[xi]$, $Y=[yi]$ ，X是英文，Y是中文翻譯

cat dog tiger
貓 狗 老虎

- ❑ 存檔Chinese.txt+

I love 貓 and love 狗, but I am afraid of 老虎.

Exercise

□ code

```
def getHeader(): #讀取檔案第0行和第2行
    i=0
    with open('translate.txt', 'r', encoding="utf-8") as infile:
        for line in infile:
            if i==0:
                eng=line.split()
            else:
                chi=line.split()
            i = i + 1
    return eng, chi
```

```
def convert(aFile, bFile, eng, chi):
    f1 = open(aFile, encoding="utf-8")
    f2 = open(bFile, 'w', encoding="utf-8")
    data = f1.read()
    #zip將eng, chi打包成 tuple
    for e, c in zip(eng, chi):
        data = data.replace(e, c)
        print(e, c, data)
    print(data, '####')
    f2.write(data)
    f1.close()
    f2.close()

eng, chi = getHeader()
convert('English.txt', 'Chinese.txt', eng, chi)
```

讀取CSV檔案

班級	學號	期中考成績
一甲	110591052	80
一甲	110591053	90
一乙	110591054	85
一丙	110591055	75
一丙	110591056	95
一丙	110591057	80
一丙	110591058	90
一乙	110591059	100
一乙	110591060	85
一乙	110591061	95

❑ csv.reader()讀取csv資料，一列一列印出

```
import csv
#f= open('data.csv', encoding='utf-8')
f= open('data.csv')
readFile = csv.reader(f) #<_csv.reader object at 0x0000025AE3EE2EC0>
print(readFile)
for row in readFile:
    print(row)
f.close()
```

❑ 使用with開啟csv檔案

- 加上 `newline=""`，為讓資料中包含的換行符號可正確解析

```
import csv
with open('data.csv', newline="") as csvfile:
    readFile = csv.reader(csvfile)
    for row in readFile:
        print(row)
```

讀取CSV檔案

□ 指定分隔符號

- 資料欄位分隔符號非使用預設逗號，而是其他符號，讀取時要指定分隔符號

```
import csv
with open('data2.csv', newline='') as csvfile:
    readFile = csv.reader(csvfile, delimiter=':')
    for row in readFile:
        print(row)
```

```
班級:學號:期中考成績
一甲:110591052:80
一甲:110591053:90
一乙:110591054:85
一丙:110591055:75
一丙:110591056:95
一丙:110591057:80
一丙:110591058:90
一乙:110591059:100
一乙:110591060:85
一乙:110591061:95
```

讀取CSV檔案

□ class.csv

```
班級,學號,期中考成績  
一甲,110591052,80  
一甲,110591053,90  
一乙,110591054,85  
一丙,110591055,75  
一丙,110591056,95  
一丙,110591057,80  
一丙,110591058,90  
一乙,110591059,100  
一乙,110591060,85  
一乙,110591061,95
```

□ 讀取csv 檔案內容後，轉為dictionary 格式

- **csv.DictReader()** 自動把第一列(row)當作欄位名稱，第二列後的每一列轉為 dictionary，如此可以使用欄位名稱存取資料

```
import csv  
with open('class.csv', newline='') as csvfile:  
    readFile = csv.DictReader(csvfile)  
    print(readFile) #印出 <csv.DictReader object at 0x0000025AE3F9F010>  
    for row in readFile:  
        print(row['班級'], row['學號'], row['期中考成績'])
```

寫入CSV檔案

□ 一次寫入二維表格

- 若資料是已整理好二維表格，可一次把整張表格寫進 csv 檔案

```
import csv
# 二維表格
table = [['班級', '學號', '成績'],
         ['資工一', '109590001', 90],
         ['資工一', '109590002', 85]]
with open('output.csv', 'w', newline='') as csvfile:
    writer = csv.writer(csvfile)
    writer.writerows(table) # 寫入二維表格
```

□ 寫入 Dictionary

- 資料格式是 dictionary，可使用 `csv.DictWriter()` 寫入 csv 檔案中

```
import csv
with open('output.csv', 'w', newline='') as csvfile:
    columns = ['班級', '學號', '成績']
    # 將 dictionary 寫入 CSV 檔
    writer = csv.DictWriter(csvfile, fieldnames=columns, delimiter=',')
    writer.writeheader() # 寫入第一列的欄位名稱
    writer.writerow({'班級': '資工一', '學號': '109590003', '成績': 95}) # 寫入資料
    writer.writerow({'班級': '資工一', '學號': '109590004', '成績': 88}) # 寫入資料
```

`delimiter=','` is optional

Exercise

- 一行一行讀檔案 score.txt
 - 計算平均，將平均寫到最下面

Input file: score.txt

```
班級,學號,期中考成績,  
資工一,109590001,88,  
資工一,109590002,90,  
資工一,109590003,92,  
資工一,109590004,85,  
資工一,109590005,87,  
資工一,109590006,95,  
資工一,109590007,80,  
資工一,109590008,84,  
資工一,109590009,86,  
資工一,109590010,83,
```

Output file: avg_score.txt

```
Class,Student ID,Score,  
資工一,109590001,88,  
資工一,109590002,90,  
資工一,109590003,92,  
資工一,109590004,85,  
資工一,109590005,87,  
資工一,109590006,95,  
資工一,109590007,80,  
資工一,109590008,84,  
資工一,109590009,86,  
資工一,109590010,83,  
平均,,87.0,
```

Exercise

□ 製作一個csv檔 score.csv

- 一行一行讀檔案 score.csv，製作成字典
- 計算每位學生平均，寫在學生資料最後，計算全班平均，寫到最下面

Input file: score.csv

```
班級,學號,國文,數學,英文  
資工一,109590001,80,80,80  
資工一,109590002,90,90,90  
資工一,109590003,70,70,70  
資工一,109590004,60,60,60,
```

Output file: output.csv

```
Class,Student ID,average,  
資工一,109590001,80,  
資工一,109590002,90,  
資工一,109590003,70,  
資工一,109590004,60,  
75,75,75,75
```


Exercise

- ❑ 製作一個csv檔 score.csv
 - 一行一行讀檔案 score.csv，製作成字典
 - 計算每位學生平均，寫在學生資料最後，計算全班平均，寫到最下面
- ❑ 輸出成 output.csv


score.csv


```
班級,學號,國文,數學,英文  
資工一,109590001,80,80,80  
資工一,109590002,90,90,90  
資工一,109590003,70,70,70  
資工一,109590004,60,60,60,
```


Output.csv

```
Class,Student ID,average,  
資工一,109590001,80,  
資工一,109590002,90,  
資工一,109590003,70,  
資工一,109590004,60,  
75,75,75,75
```

Exercise

```
import csv
def trans(row):
    data = {}
    score = 0
    subject = ['國文','英文','數學']
    for key, value in row.items():
        print('=>', key, value)
        if key in subject:
            score = score + int(value)
    for key, value in row.items():
        if 
        eli
    data['average'] = score//3
    return data

with open('x.csv', newline='') as csvfile:
    readFile = csv.DictReader(csvfile)
    #print(readFile)
    inData = []
    for row in readFile:
        
    inData.append(trans(row))
print(inData)

with open('y.csv', 'w', newline='') as csvfile:
    #columns = ['班級', '學號', '國文', '數學', '英文']
    columns = ['Class', 'Student Id', 'average']
    # 將 dictionary 寫入 CSV 檔
    writer = csv.DictWriter(csvfile, fieldnames=columns, delimiter=',')
    writer.writeheader() # 寫入第一列的欄位名稱
    for data in inData:
         # 寫入資料
```

END

