Test time:

OCT 12 WLB 103 15:30 to 17:00

COMP7035

Python for Data Analytics and Artificial Intelligence

File IO

Renjie Wan, Xue Wei

2/10/2022

香港浸會大學
HONG KONG BAPTIST UNIVERSITY

DEPARTMENT OF
COMPUTER SCIENCE
計算機科學系

What we will learn?

Topic		Hours
I.	Python Fundamentals A. Program control and logic B. Data types and structures C. Function **D. File I/O**	12
II.	Numerical Computing and Data Visualization Tools and libraries such as A. NumPy B. Matplotlib C. Seaborn	9
III.	Exploratory Data Analysis (EDA) with Python Tools and libraries such as A. Pandas B. Sweetviz	9
IV.	Artificial Intelligence and Machine Learning with Python Tools and libraries such as A. Keras B. Scikit-learn	9

How to control your function?

- Give your function more constraints:
  - We can use if or only other control measures.

```
def triangle_area(base, height):
  if base<0 or height < 0:
    print("Base and height must be non-negative")
    return
  return 0.5*base*height
triangle_area(-1,2)
```

How to interact with PC

- The *input([prompt])* function accepts from the user

```
str = input("Enter your input: ")
print("Received input is : ", str)
```

This is a string value

```
x = input('Enter your name:')
print('Hello, ' + x)
```

How to interact with your PC

- How to play with input

```
base = int(input("Enter the base:"))
height = int(input("Enter the height:"))
if base < 0 or height < 0:
    print("Base and height must be non-negative")
else:
    area = 0.5*base*height
    print("The area is:", area)
```

How to transfer value types

- From str to int
- **int() :** Used to **convert string into an integer.**
- **str(): Convert integer to string**

```
print(type("1"))
print(type(int("1")))
```

- From int to float
- **float()**: This function is used to convert **any data type to a** floating-point **number.**

```
print(type(1))
print(type(float(1)))
```

How to transfer value types

- tuple() : This function is used to convert to a tuple.
- set() : This function returns the type after converting to set.
- list() : This function is used to convert any data type to a list type.

```
s = 'geeks'

# printing string converting to tuple
c = tuple(s)
print ("After converting string to tuple : ",end="")
print (c)

# printing string converting to set
c = set(s)
print ("After converting string to set : ",end="")
print (c)

# printing string converting to list
c = list(s)
print ("After converting string to list : ",end="")
print (c)
```

Opening a file

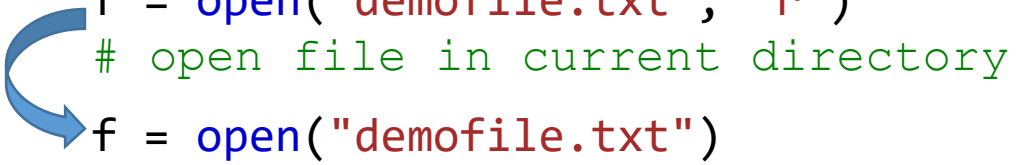
- Python has a built-in open() function to open a file. This function returns a file object, also called a handle, as it is used to read or modify the file accordingly.

```
f = open(filename, option)
Filename: path and filename
Option:
```


"r" - Default value. Opens a file for reading

"a" - Opens a file for appending at the end of file, creates the file if it does not exist

"w" - Opens a file for writing, creates the file if it does not exist



We need to close a file after we are done: `f.close()`

How to write something into a file

- The *write()* method writes any string to an open file. It is important to note that Python strings can have binary data and not just text.
- The *close()* method of a file object flushes any unwritten information and closes the file object, after which no more writing can be done.
- Remember to close file everytime.


```
#!/usr/bin/python # Open a file
fo = open("test.txt", "w")
fo.write( "Python is a great language.\nYeah its great!!\n")

fo.close()
```

How to write something into a file

- Always close a file object when you are done with it
- If you do not want to use close, you can also try with open:
- with open(filename) as var
  - opens the file ⟨filename⟩
  - assigns the corresponding file object to ⟨var⟩
  - automatically closes the file when we leave the with-block

```
with open("test.txt", "w") as fo:
  fo.write( "Python is a great language.\nYeah its great!!\n")
```

How to create a directory

- You can use the *mkdir()* method of the os module to create directories in the current directory. You need to supply an argument to this method which contains the name of the directory to be created.

```
#!/usr/bin/python
import os

# Create a directory "test"
os.mkdir("test")
```

How to delete a directory

- *os.rmdir()* method in Python is used to remove or delete a empty directory. OSError will be raised if the specified path is not an empty directory.

```
#!/usr/bin/python
import os

# Create a directory "test"
os.rmdir("test")
```

Create multiple directories

- *os.makedirs()* method in Python is used to create a directory recursively. That means while making leaf directory if any intermediate-level directory is missing, *os.makedirs()* method will create them all.

```
#!/usr/bin/python
import os
os.makedirs("test/test2")
```

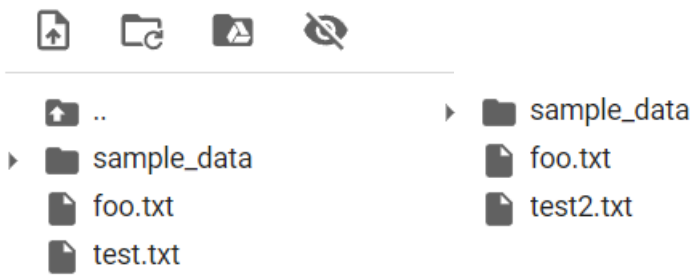
How to delete and rename files

- Rename a file

```
import os
os.rename( "test.txt", "test2.txt" )
```

- Delete a file

```
import os
os.remove("test2.txt")
```



Differences between r and r+

- r: Open text file for reading. The stream is positioned at the beginning of the file.
- r+: Open for reading and writing. The stream is positioned at the beginning of the file.
- w: Create text file for writing. The stream is positioned at the beginning of the file.
- w+: Opens a file for both writing and reading. Overwrites the existing file if the file exists. If the file does not exist, creates a new file for reading and writing.
- rb, wb use for reading and writing binary format (usually for images)

How to read the opened file

- The *read(size)* method reads a string from an open file. Size here denotes the number of characters to be read

```
#!/usr/bin/python # Open a file
fo = open("test.txt", "r+")
str = fo.read(10);
print("Read String is : ", str)

# Close opend file
fo.close()
```

Python is a great language.
Yeah its great!!

If size = 1:

```
Read String is : P
```

If size = 2:

```
Read String is : Py
```

If we do not set the size number:

```
Read String is : Python is a great
language. Yeah its great!!
```

The current position of File Handle

- *tell()* method returns current position of file object

```
#!/usr/bin/python # Open a file
fo = open("test.txt", "r+")
print("Initial Position:", fo.tell())

str2 = fo.read(10);
print("Read String is : ", str2)

print("Current Position:", fo.tell())
# Close opend file
fo.close()
```

readline()

- The *readline()* method returns one line from the file.

```
# open the file
fo = open("test.txt", "r")
print("The file name is: ", fo.name)

print(f.readline()) #read the first line
print(f.readline()) #read the second line

# close the file
fo.close()
```

readlines()

- The *readlines()* method returns all lines from the file.

```
#!/usr/bin/python
# -*- coding: UTF-8 -*-

# open the file
fo = open("test.txt", "r")
print("The file name is: ", fo.name)

for line in fo.readlines():
    print("The read file is: %s" % (line))

# close the file
fo.close()
```

writelines

- *writelines()* method to write items in a list object to a file. The newline characters ("\n) should be the part of the string.

```
lines=[" Beautiful is better than ugly.\n", "Explicit
 is better than implicit.\n”]
```

```
lines=[" Beautiful is better than ugly.", "Explicit i
s better than implicit.”]
```

```
f=open("python.txt","w")
f.writelines(lines)
f.close()
```

Some examples

Example: Count the number of words

```
def count_words(filepath):
    with open(filepath) as f:
        data = f.read()
        data.replace(",", " ")
        return len(data.split(" "))

with open("open.txt", "w+") as f:
    f.write("Write a Python program that accept some words, Hel
lo Hello")
print(count_words("open.txt"))
```