

Python / Concept

Scripting Language

The interpreter executes source code directly **without compiling it** into an executable program, resulting in lower efficiency and execution performance.

Cross-Platform

Python is open-source, and the same Python code **can run on different platforms** as long as a compatible interpreter is available.

Identifiers

Composed of letters, underscores, and numbers, but cannot start with a number.

Python / Core

Constants and Variables

coding=utf-8 # Declare file encoding

a=100 **a,b=100,200** **a=0b1000** (Binary) **a=0o1000** (Octal) **a=0x189** (Hexadecimal) **a=3+4j** **a=3.0+4.0j**

Numeric types

a=1000.0

Float

a="John" **a,b="Jonh","Alice"** **a='John'** **a="ab"+"c"*2** (Result: 'abcc') **a=b'a\x01c'** (Bytes string) **a=u'sp\xc4m'** (Unicode string)

a=r'C:\Desktop' (Raw string to ignore escape sequences) **a=f'xx{val}xx'** (Formatted)

a="abcdef"[2:5] (Substring from index 2 to 5, 5 is exclusive, and any exceeded index will be ignored without raising an error)

String

There is no functional difference between 'str' and "str".

a=True **a,b=True,False** **a=False**

Boolean

a={} **a,b={},{} a={"name":"lala","age":12 }** **a=dict(hours=10)** **a=dict()**

Dictionary

value = a['name'] # Access dictionary value

a["city"] = "New York" # Add a new key-value pair

a.get("city", "empty") # Return a default value (None if not present)

"city" in numDict # Check if "city" is a key in numDict.

a=[] **a,b=[],[]** **a=[[1, 3, 4], [2, 3, 5], [1, 2, 3, 5], [2, 5]]** **a=[0] * 10** (Creates a list with 10 zeros)

List

In Python, lists do not automatically expand when you assign to an index that is out of range

value = a[3]

Access list value

a[3] = 9

Change list value

a[-1] = 9

Change last value

a = [1, 2, 2, 3]

a[-1] = 9

print(a) # Output: [1, 2, 2, 9]

a[999]

IndexError: list index out of range

```

sublist = a[2:5]
    Get elements from index 2 to index 4 (5 is exclusive)
    a = [1, 2, 2, 3]
    sublist = a[2:5]
    print(sublist) # Output: [2, 3]

    a = [1, 2, 2, 3]
    sublist = a[-1:5]
    print(sublist) # Output: [3]

    a = [1, 2, 2, 3]
    sublist = a[-1:2]
    print(sublist) # Output: []

    a = [1, 2, 2, 3]
    sublist = a[3:2]
    print(sublist) # Output: []

```

```

a.append(10)
    Extend the list, adds 10 at the end of the list
a.extend([4, 5])
    Extend the list, adds 4 and 5 to the end of the list
a.insert(1, 10)
    Inserts 10 at index 1, shifting other elements
    Time Complexity: O(n), where n is the number of elements in the list.
    arr = [1, 2, 3]
    arr.insert(5, 10)
    print(arr) # Output: [1, 2, 3, 10]

    arr = [1, 2, 3]
    arr.insert(1, 10)
    print(arr) # Output: [1, 10, 2, 3]

```

```

if 3 in arr:
    Check if 3 is in the array
if 3 in numDict.get(val):
    If numDict.get(val) returns None, then Python will raise a TypeError because None is not iterable,
    and the in operator cannot be used to check membership in None.
if val in numDict and 3 in numDict[val]:
    Do something if 3 is in the value of the given key

```

```

a={'a', 'b', 'c'} a,b=set(),set() a=set('abc')

```

Set

a,b={},{} {} is the syntax for an empty dictionary in Python, not a set

```

a=(1, 'spam', 4, 'U') a,b=tuple(),tuple() a=tuple('spam')

```

Tuple

```

b, c, d, e = a    # Unpacking tuple
val = a[1:5]      # Slice tuple from index 1 to 4 (exclusive)
val = a[3]        # Access third element

```

Data Type Conversion

int(x)

Converts x to an integer

long(x)

Converts x to a long integer (Python 2.x only).

float(x)

Converts x to a floating-point number.

complex(real [,imag])

Creates a complex number with real and an optional imag part.

`str(x)`

Converts x to a string.

`repr(x)`

Returns a string representation of x that could be used as a valid Python expression.

`eval("expression")`

Evaluates the Python expression in a string and returns the result.

`tuple(s)`

Converts sequence s to a tuple.

`list(s)`

Converts sequence s to a list.

`chr(68)`

Converts an integer to its corresponding character (e.g., `chr(68)` returns 'D').

`unichr(2)`

Converts an integer to a Unicode character (Python 2.x only).

`ord('x')`

Converts a character to its corresponding integer value (e.g., `ord('x')` returns 120).

`hex(99)`

Converts an integer to its hexadecimal string representation (e.g., `hex(99)` returns '0x63').

`oct(88)`

Converts an integer to its octal string representation (e.g., `oct(88)` returns '0o130').

`bytearray(b'\x01\x02\x03')`

Returns a new bytearray object.

Type Checking

`type(x)`

Returns the type of x (does not consider subclass relationships).

// `type(a) == str` checks if a is exactly of type str.

`isinstance(x, y)`

Checks if x is an instance of y, considering subclass relationships.

// `isinstance(1, int)` returns True.

// `isinstance(1.0, float)` returns True.

// `isinstance("xxx", str)` returns True.

Operators

Notes:

The ++ increment operator is not valid in Python, unlike in languages like C or Java.

pass

A placeholder for an empty function or block, effectively a no-op.

for val **in** list:

Iterates through the list, getting each value.

for ind **in** range(len(list)):

Iterates through indices of a list.

for ind, val **in** enumerate(sequence):

Iterates through both indices and values of a sequence.

```
[print(val) for val in list]
```

To loop through a list and perform an action (e.g., print values):

You cannot use the assignment = inside a generator expression directly.

```
[print(val) for val in list if val > 10]
```

To loop through a list and perform an action only on certain it

```
new_list = [item * 2 for item in list]
```

To loop through a list and modify another list

```
(func(val) for val in list)
```

To loop without storing results in memory as a list (generating items lazily)

for key **in** dict1:

for key **in** dict1.keys():

Iterates through the dictionary, getting each key

for key **in** dict1.values():

Iterates through the dictionary, getting each value

for key, val **in** dict1.items():

Iterating over key-value pairs

```
dict2 = {key: val for key, val in dict1.items() if value > 10}
```

Create a new dictionary with values greater than 10

while not (condition):

The loop continues until the condition is true.

if val **is** None:

elif condition2:

elif condition3:

else:

Checks if val is exactly None.

```
// val is not None and val > 2
```

```
// val is None or val > 2
```

```
// numDict.get(val) is not None and left != -1
```

if not val **is** None:

Checks if val is not None using a negated condition.

if not val:

Checks if val is falsy (e.g., None, False, empty strings "", 0, empty list [], empty dictionary {}, empty tuple []).

a **if** a > b **else** b

Returns a if a > b; otherwise, returns b.

```
9 // 8
```

Performs integer division (returns an integer result, i.e., 1).

Type Hints (introduced in Python 3.5)

Basic Types

```
x: int = 42
```

```
y: float = 3.14
```

```
z: str = "hello"
```

```
is_active: bool = True
```

Union (Multiple Allowed Types)

```
from typing import Union
num: Union[int, float] = 10 # Can be either int or float
```

In Python 3.10+, you can use | instead:

```
num: int | float = 10
```

Optional (Allows None)

```
from typing import Optional
name: Optional[str] = None # Equivalent to Union[str, None]
```

In Python 3.10+:

```
name: str | None = None
```

Collection Types

Lists, Tuples, Sets, Dicts

```
from typing import List, Tuple, Set, Dict

numbers: List[int] = [1, 2, 3]
coords: Tuple[float, float] = (10.5, 20.2)
tags: Set[str] = {"python", "typing"}
user: Dict[str, int] = {"age": 25}
```

Python 3.9+ uses built-in generics instead:

```
numbers: list[int] = [1, 2, 3]
user: dict[str, int] = {"age": 25}
```

Callable (Functions)

```
from typing import Callable
```

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

```
operation: Callable[[int, int], int] = add
```

Any (Disables Type Checking)

```
from typing import Any
```

```
data: Any = "string"
data = 42 # Allowed
```

Custom Classes

```
class User:
    def __init__(self, name: str):
        self.name = name
```

```
user: User = User("Alice")
```

Type Aliases

```
from typing import Union
```

```
Number = Union[int, float]
age: Number = 30
```

Generics (For Reusable Types)

```
from typing import TypeVar, Generic
```

```
T = TypeVar("T")

class Box(Generic[T]):
    def __init__(self, content: T):
        self.content = content

int_box = Box    # Box containing an int
```

Self-Referencing Types (Type and Self)

```
from typing import Type, Self

class Animal:
    def create(cls: Type["Animal"]) -> "Animal":
        return cls()

    def copy(self) -> Self:
        return self
```

```
class SegmentTree:
    def __init__(self, left: "SegmentTree" = None):
        self.left = left
```

Literal (Fixed Values)

```
from typing import Literal

status: Literal["success", "failure"] = "success"
```

Python / Features

Function

Usage

```
def func(a, b=9, c=None, *rest):
    # *rest: Collects extra positional arguments into a tuple.
    global globalval
    globalval += 1
    # This modifies the global variable 'globalval'
    # When modifying a global variable inside a function, you must declare it as global.
    # Otherwise, Python treats it as a local variable and raises an error if accessed as global later.
    return a+b
```

```
func(1, 2, 3, 4)
# Passing arguments, 4 will go into *rest
```

```
def func(a, b, **rest):
    # **rest: Collects extra keyword arguments into a dictionary.
    return a+b
```

```
func(1, 2, name="craig", age=12)
# The keyword arguments are captured in the **rest dictionary
```

```
func(a= 1, b= 2, name="craig", age=12)
```

Definition

class **Person**:

// Class content

```
class Son(Person):           # Inherit from Person
    def __init__(self, name, age):
        Person.__init__(self) # Call parent class constructor
        self.name = name
        self.age = age
```

```
per = Person("aa", 22)      # Create an instance
```

Fields

money=99.9; static members (it can be accessed directly by the class name: Person.money)

Constructor

```
def __init__(self, name, age):    # Constructor (called when an instance is created)
    self.name = name
    self.age = age
    Person.money += 1
```

Methods

```
def func(self):                 # Instance method
    print(self.name, self.age)
    self.func2()                # Calling another instance method
```

@staticmethod

```
def statfunc(a):               # Static method, can be called as Person.statfunc() (does not require `self`)
    print(Person.money)
```

@classmethod

Class method (can be called without instantiating the class)

```
def clsfunc(cls):
    print(cls.money)
    cls().func()               # Calls an instance method
```

Built-in Attributes

Person.[__dict__](#)
Dictionary containing class attributes

Person.[__doc__](#)
Class documentation string

Person.[__name__](#)
Class name

Person.[__module__](#)
Module where the class is defined

Example: If className is in module mymod, then className.[__module__](#) == "mymod"

Person.[__bases__](#)
Tuple containing **all parent classes**

Instance Attribute Access

`hasattr(per, 'age')`

Returns True if the attribute 'age' exists

`getattr(per, 'age')`

Retrieves the value of 'age'

`setattr(per, 'age', 8)`

Sets the value of 'age' to 8

`delattr(per, 'age')`

Deletes the attribute 'age'

Exception

try:

```
raise Exception("aaa")    # Raise an exception
```

except Exception:

```
print("aaa")
```

finally:

```
print("final")
```

try block

Contains code that might throw an exception.

except block

Catches and handles exceptions of the specified type (Exception in this case).

finally block

Executes no matter what, even if an exception was raised or not.

Import package

Absolute Import

```
from <module-name> import a, b    # Absolute import
```

Imports a and b from <module-name>.

Python first checks if a and b are variables in the `__init__.py` file of the package.

Then it checks if <module-name> is a subpackage or module, and raises an `ImportError` if not found.

Relative Import

```
from ...<module-name> import *    # Relative import
```

The `.` refers to the current directory, and each additional `.` refers to the parent directory.

For example, `...` moves up two levels in the directory structure.

Python / Build-in Libraries

Global

`__name__`

It can be used to check if the file is being run directly or imported.

If the file is run directly, `__name__` is set to `"__main__"`.

If the file is imported as a module, `__name__` will be set to the module's name.

```
if __name__ == "__main__":
    print("This script is being run directly")
```

`__file__`

The path of the current Python file. It can be an absolute or relative path, depending on how the script is executed.

```
print(__file__)    # Prints the relative or absolute path of the current script
```



```
input("str")
```

Prompts the user for input

```
print("str")
```

Prints "str"

```
range(2, 6)
```

Range from 2 to 5 (6 is not included)

```
for i in range(2, 6):  
    print(i) # Output: 2 3 4 5
```

```
range(0, 10, 2)
```

Range from 0 to 10 with a step of 2

```
for i in range(0, 10, 2):  
    print(i)
```

bisect

```
def bisect_right(a: Sequence[T], x: T, lo: int = 0, hi: Optional[int] = None) -> int:
```

Return the index where to insert item x in list a, assuming a is sorted.

Find the first element that satisfies $a[i] > x$.

If x already appears in the list, i points just **beyond the rightmost x** already there.

Optional args lo (default 0) and hi (default len(a)) bound the slice of a to be searched.

Time Complexity: $O(\log n)$

The list a is assumed to be sorted, and the methods use binary search to find the appropriate insertion point.

Binary search divides the list in half on each iteration, which leads to a time complexity of $O(\log n)$.

```
a = [1, 2, 2, 3]
```

```
i = bisect.bisect_right(a, 2)  
print(i) # Output: 3
```

```
i = bisect.bisect_right(a, 2.5)  
print(i) # Output: 3
```

```
i = bisect.bisect_right(a, 999)  
print(i) # 4
```

```
i = bisect.bisect_right(a, -999)  
print(i) # 0
```

```
a = [3, 8]
```

```
b = [3, 3, 8, 8]
```

```
c = [3, 3, 5, 8, 8]
```

```
L, R = bisect_right(a, val1), bisect_left(a, val2)
```

Case 1 ($val2 \leq 3$):

```
[3, 8]
```

```
L
```

```
R
```

```
[3, 3, 8, 8]
```

```
L
```

```
R
```

Case 2 ($val1 \geq 3, val2 \leq 8$):

```
[3, 8]
```

```

      L
      R
[3, 3, 8, 8]
      L
      R
[3, 3, 5, 8, 8]
      L  R

```

Case 3 (val1 >= 3 and val1 < 8, val2 >=8):

```

[3, 8]
      L
      R
[3, 3, 8, 8]
      L
      R
[3, 3, 5, 8, 8]
      L  R

```

Case 4 (val1 >=8):

```

[3, 8]
      L
      R
[3, 3, 8, 8]
      L
      R

```

```

[0, val1, val2, 4]  (val1 >= 0, val2 < 4)
val1 < val2 < a[L]  (a[L] = 4, a[R] = 4)

```

```

[0, val1, 4, val2]  (val1 >= 0, val2 > 4)
0 < val1 < val2 a[r]  (a[l] equals a[r])

```

def `bisect_left`(a: Sequence[T], x: T, lo: int = 0, hi: Optional[int] = None) -> int:

Return the index where to insert item x in list a, assuming a is sorted.

Find the first element that satisfies `a[i] >= x`.

So if x already appears in the list, i points just the leftmost x already there.

Time Complexity: $O(\log n)$

The list a is assumed to be sorted, and the methods use binary search to find the appropriate insertion point.

Binary search divides the list in half on each iteration, which leads to a time complexity of $O(\log n)$.

```
a = [1, 2, 2, 3]
```

```
i = bisect.bisect_left(a, 2)
print(i) # Output: 1 (first 2)
```

```
i = bisect.bisect_left(a, 2.5)
print(i) # Output: 3 (before 3, after 2)
```

```
i = bisect.bisect_left(a, 999)
print(i) # Output: 4
```

```
i = bisect.bisect_left(a, -999)
print(i) # Output: 0
```

```
def insort_left(a: List[T], x: T, lo: int = 0, hi: Optional[int] = None) -> None:
```

Insert item x in list a, and keep it sorted assuming a is sorted.

If x is already present, it is inserted **before the leftmost existing element**.

```
a = [1, 2, 2, 3]
```

```
bisect.insort_left(a, 2)
```

```
print(a) # Output: [1, 2, 2, 2, 3] (inserts before first 2)
```

```
bisect.insort_left(a, 2.5)
```

```
print(a) # Output: [1, 2, 2, 2, 2.5, 3] (inserts before 3, after 2s)
```

```
bisect.insort_left(a, 999)
```

```
print(a) # Output: [1, 2, 2, 2, 2.5, 3, 999] (inserts at the end)
```

```
bisect.insort_left(a, -999)
```

```
print(a) # Output: [-999, 1, 2, 2, 2, 2.5, 3, 999] (inserts at the beginning)
```

collections

Counter(list)

Return a frequency map of the list

```
// [1, 2, 2, 3, 3, 3, 4] -> {3: 3, 2: 2, 1: 1, 4: 1}
```

```
counter.update([1, 2, 2, 3]) -> {3: 4, 2: 4, 1: 2, 4: 1}
```

Updates the counter with the elements from another iterable or dictionary.

```
// "hello world" -> {'l': 3, 'o': 2, 'h': 1, 'e': 1, ' ': 1, 'w': 1, 'r': 1, 'd': 1}
```

Time complexity: O(n)

list

Python < 3.9

```
from collections import Counter
```

```
from typing import List # For Python < 3.9; otherwise, use list[int]
```

class Solution:

```
def intersect(self, nums1: List[int], nums2: List[int]) -> List[int]:
```

Python 3.9+

```
from collections import Counter
```

class Solution:

```
def intersect(self, nums1: list[int], nums2: list[int]) -> list[int]:
```

append() 追加元素

insert(2, "99") 在索引插入值

count() 方法用于统计某个元素在列表中出现的次数 (> 0)

extend([1, 2, 3]) 当前列表 追加新列表

index(xxval) 从数组中找出某个值第一个匹配项的索引值

tuple

cmp(xxtup1, xxtup2): 比较两个元组元素 (元组中的元素是不允许被修改的)

len(xxtup): 返回元组中元素的个数

max(xxtup): 返回元组中元素最大的值

min(xxtup) 返回元组中元素最小的值

<code>tuple(xxseq)</code>	将列表转化为元组
<code>index(xxval)</code>	从元组中找出某个值第一个匹配项的索引值
<code>count(xxval)</code>	统计某个元素在元组中出现的次数

str

"a {0} b {1}".format(name,age)	填充前方括号，返回格式化字符串
"a {name} b {url}".format(**xxDict)	通过字典的键设置参数
"a {0[0]} b {0[1]}".format(xxList)	通过列表索引设置参数（前方的 0 是必须的）
"John %s like %s" %('repstr1', 'replace2')	格式化字符串
"Hey %(name) s, there is a 0x%(errno)x error!" %{"name": name, "errno": errno }	格式化字符串
result = "world" in str	判断字符串是否包含 【false】

replace ("xxold", "xxnew")	不支持正则 (不改变原本字符串)
split (self, sep, maxsplit):	分隔符, 分隔次数
rstrip ("n")	删除字符串末尾指定字符
'n'.join (xxlist)	用一个字符连接数组
str.upper()	# 把所有字符中的小写字母转换成大写字母
str.lower()	# 把所有字符中的大写字母转换成小写字母
str.capitalize()	# 把第一个字母转化为大写字母, 其余小写
str.title()	# 把每个单词的第一个字母转化为大写, 其余小写

dict

`dict(dict1, **dict2)` 合并字典（键相同时，后方覆盖前方）
`__contains__("xxkey")` 是否有一个键
`get("xxkey")` 根据键获取一个值
`update({"new_food":0})` 添加键值对
`keys()` 返回对象 key 迭代器，不是数组 // `len(xxdict.keys())` 键个数 `list(dic.keys())` 字典键列表
`list(dic.values())` 字典值列表

file

`open("test.txt", "w", encoding="utf-8")` 直接打开一个文件，如果文件不存在则创建文件

- `w` 以写方式打开（原有内容会被删除）
- `a` 以追加模式打开（从 EOF 开始，必要时创建新文件）
- `r+` 以读写模式打开（+ 加号表示 如果该文件不存在，创建新文件）
- `w+` 以读写模式打开（参见 `w`）
- `a+` 以读写模式打开（参见 `a`）
- `rb` 以二进制读模式打开
- `wb` 以二进制写模式打开（参见 `w`）
- `ab` 以二进制追加模式打开（参见 `a`）
- `rb+` 以二进制读写模式打开（参见 `r+`）
- `wb+` 以二进制读写模式打开（参见 `w+`）
- `ab+` 以二进制读写模式打开（参见 `a+`）

`write("content")` 写入文件

`close()` 关闭文件

`read()` 每次读取整个文件，它通常用于将文件内容放到一个字符串变量中。如果文件大于可用内存，为了保险起见，可以反复调用 `read(size)` 方法，每次最多读取 `size` 个字节的内容。

`readlines()` 之间的差异是后者一次读取整个文件，象 `.read()` 一样。`.readlines()` 自动将文件内容分析成一个行的列表，该列表可以由 Python 的 `for ... in ...` 结构进行处理。

`readline()` 每次只读取一行，通常比 `readlines()` 慢得多。仅当没有足够内存可以一次读取整个文件时，才应该使用 `readline()`。

re (正则)

`sub(r'\n|s|p', "xxreplace", "xxtarget")` `xxreplace` 替换 `xxtarget` 内部正则匹配部分 之后的字符串

【没有返回原来的字符串】

`search(r'\n|s|p', "xxx", flags=0)` 匹配整个字符串，直到找到一个匹配【没找到返回 None】

`result.group()` 返回匹配结果第一个 // <re.Match object; span=(11, 49),

`match='154792957E1EB672580707A0129CF736.node1'>`

`result.groups()` 返回所有匹配结果

time (代码停顿)

`sleep(10)` 暂停 10 秒

`time()` 返回秒级时间戳 //EX: 1639025762.660346

`tsp` 原始时间数据 // 1499825149.257892

`int(tsp)` 秒级时间戳 // 1499825149 (10 位)

`int(round(tsp * 1000))` 毫秒级时间戳 // 1499825149257 (13 位)

`int(round(tsp * 1000000))` 微秒级时间戳 // 1499825149257892 (16 位)

`ctime(tsp)` 格式化秒级时间戳 Tue Feb 17 10:00:18 2013

`strftime("%Y-%m-%d %H:%M:%S", time.localtime())` 获取格式化时间

datetime

`%y` 两位数的年份表示 (00-99)

`%Y` 四位数的年份表示 (000-9999)

`%m` 月份 (01-12)

`%d` 月内中的一天 (0-31)

`%H` 24小时制小时数 (0-23)

`%I` 12小时制小时数 (01-12)

`%M` 分钟数 (00=59)

`%S` 秒 (00-59)

`%a` 本地简化星期名称

`%A` 本地完整星期名称

`%b` 本地简化的月份名称

`%B` 本地完整的月份名称

`%c` 本地相应的日期表示和时间表示

`%j` 年内的一天 (001-366)

`%p` 本地A.M.或P.M.的等价符

`%U` 一年中的星期数 (00-53) 星期天为星期的开始

`%w` 星期 (0-6) , 星期天为星期的开始

`%W` 一年中的星期数 (00-53) 星期一为星期的开始

`(dobj + datetime.timedelta(hours=1)).strftime("%Y-%m-%d %H:%M:%S")` 当前时间加 1 小时【datetime 对象能直接比较和加减】

`(dobj - relativedelta(years=1)).strftime("%Y-%m-%d %H:%M:%S")` 当前时间减 1 年

`time()`

`datetime(2012, 04, 22).strftime('%w')` 年月日转换成时间，获取今天的星期

`datetime:`

`now()` 获取当前时间 // 2021-12-09 12:56:02.660346 【datetime 对象可以直接比大小】

`strptime('09/19/18 13:55:26', '%m/%d/%y %H:%M:%S')` 字符串 转 datetime

os

`mknod("text.txt")` 创建空文件

`makedirs("/usr")` 创建路径

`remove("/usr/test.txt")` 删除文件

`removedirs("/usr/home")` 删除多个目录

`path.exists("test.txt")` 路径是否存在

`path.dirname(r"/usr/test.txt")` 去掉文件名，返回目录

`path.abspath(os.path.dirname(__file__))` 获取当前文件的目录 //EX: __file__:

D:\Desktop\DevProject\loopo_python\sdkAi2.py

`path.realpath(".")` 获取当前文件的绝对路径
`path.join(dir_name, 'pac01', 'demo.txt')` 凭借路径
`environ['HOME']` 获取环境变量
`system("adb shell")` 执行终端命令
`chdir("xxpath")` 方法用于改变当前工作目录到指定的路径
`listdir()` 方法用于返回指定的文件夹包含的文件或文件夹的名字的列表

json

`dumps({'a': 'Runoob', 'b': 7}, sort_keys=True, indent=4, separators=(',', ':'))` 转换为 json 的双字符串格式 // [{ 'a': 1, 'b': 2, 'c': 3, 'd': 4, 'e': 5 }]
`loads(xxjsonData)` j 串转 json
`load(xxfileobj)` 读取文件对象

demjson

`demjson.encode` 将 Python 对象编码成 JSON 字符串
`demjson.decode` 将已编码的 JSON 字符串解码为 Python 对象

threading

`from threading import Thread` 子线程 (主线程会等待所有的子线程结束后才结束)
`from threading import Lock` 线程锁
`from threading import Timer` 计时器

`thread1 = Thread(target=func, args=(1,))` 创建新线程 (执行函数, 参数)
`thread1.setDaemon(True)` 如果主线程结束了, 也随之结束
`thread1.start()` 开启线程

`lock = threading.Lock()`
`lock.acquire()` 获取锁 (获取之后 多个线程只能有一个调用下方方法)
`lock.release()` 释放锁

`thread1=Timer(10,test1,())` 延迟多长时间执行任务(单位: 秒) 要执行的任务, 即函数 调用函数的参数(tuple)
`thread2=Timer(10, test2,())`

`thread1.start()`
`thread2.start()`
`thread1.join()` 主线程一直等待全部的子线程结束之后, 才继续执行

base64

#image 转 base64
`import base64`
`with open("C:\\Users\\wonai\\Desktop\\1.jpg", "rb") as f:` #转为二进制格式
`base64_data = base64.b64encode(f.read())` #使用 base64 进行加密 // 
`print(base64_data)`
`file=open('1.txt','wt')` #写成文本格式
`file.write(base64_data)`
`file.close()`

urllib

`from urllib import parse`
`urlencode(dict1)` 编码 url //将字典{k1:v1,k2:v2} 转化为 k1=v1&k2=v2
`unquote(url_data)` #解码 url //将 k1=v1&k2=v2 转化为 字典{k1:v1,k2:v2}

`quote(str1)` `#quote()`将字符串进行编码

`unquote(url_data)` `#解码 url`

pathlib

```
import pathlib
```

`xxdir=pathlib.Path("xxpath")` 返回路径对象

`xxdir.glob('train/*/*.jpg')` 返回找到的图片结果 `list(xxdir.glob("xxx"))`

random

`random.choice(xxlist)` 随机选择一个元素

math

`inf`

`inf` is commonly used to represent a value that is larger than any finite number.

`-inf`

`inf` is commonly used to represent a value that is less than any finite number.

`max(2, 3)`

`min(2, 3)`

`abs(-45)`

Absolute value `// 45`

logging

日志一共分成 5 个等级，从低到高分别是：DEBUG INFO WARNING ERROR CRITICAL。

```
logging.basicConfig(
```

```
    level=logging.INFO,
```

```
    format='%(asctime)s - %(filename)s[line:%(lineno)d] - %(levelname)s: %(message)s')
```

```
    filename='./log/log.txt',      #输出文件
```

```
    filemode='w',
```

```
)
```

```
logging.info('this is a logging info message')
```

```
logging.debug('this is a logging debug message')
```

```
logging.warning('this is logging a warning message')
```

```
logging.error('this is an logging error message')
```

```
logging.critical('this is a logging critical message')
```

`%(levelNo)s:` 打印日志级别的数值

`%(levelname)s:` 打印日志级别名称

`%(pathname)s:` 打印当前执行程序的路径，其实就是 `sys.argv[0]`

`%(filename)s:` 打印当前执行程序名

`%(funcName)s:` 打印日志的当前函数

`%(lineno)d:` 打印日志的当前行号

`%(asctime)s:` 打印日志的时间

`%(thread)d:` 打印线程 ID

`%(threadName)s:` 打印线程名称

`%(process)d:` 打印进程 ID

%(message)s: 打印日志信息

traceback

traceback.print_exc() 打印异常信息

random

一.Python 自带的 random 库

1.产生 n--m 范围内的一个随机数: random.randint(n,m)

2.产生 0 到 1 之间的浮点数: random.random()

3.产生 n---m 之间的浮点数: random.uniform(1.1,5.4)

4.产生从 n---m 间隔为 k 的整数: random.randrange(n,m,k)

5.从序列中随机选取一个元素: random.choice([1, 2, 3, 4, 5, 6, 7, 8, 9, 0])

decimal

Decimal(1.0)

Represents 1.0 as a decimal number

fractions

Fraction(1, 3)

Represents 1/3 as a fraction

Python / Third-party Package

核心包

requests

`post(url="http://www.baidu.com", json={"a":"b"}, headers = {'user-agent': 'my-app/0.0.1'}, cookies = {'key':'value'}, proxies=proxies)` 发送 post 请求 【res】

proxies={'http':"http://" + proxy, "https":"https://" + proxy} 可以不带 https

`get(url='http://www.baidu.com', params={'a': 'b'}, headers = {'user-agent': 'my-app/0.0.1'}, cookies = {'key':'value'}, proxies=proxies, timeout=120)` 带参数的 get 请求, 秒数超时

`encoding` 获取当前的编码

`encoding = 'utf-8'` 设置编码

`text` 以 encoding 解析返回内容 (字符串方式的响应体, 会自动根据响应头部的字符编码进行解码)

`content` 以字节形式, 返回二进制数据 (字节方式的响应体, 会自动为你解码 gzip 和 deflate 压缩)

`headers` 以字典对象存储服务器响应头 (这个字典比较特殊, 字典键不区分大小写, 若键不存在则返回

None)

`status_code` 响应状态码

`raw` 返回原始响应体, 也就是 urllib 的 response 对象, 使用 r.raw.read()

`ok` 是否 200 状态码 【True】

`json()` Requests 中内置的 JSON 解码器, 以 json 形式返回 (不是 json 数据解析出错会抛异常)

`raise_for_status()` 失败请求时(非 200 响应), 抛出异常

`session()` 获取 session
`get('https://xxx')` 发送请求
`cookies` 获取 session 饼干
`get_dict()` 获取饼干字典

标准化 class 写法

selenium

```
from selenium import webdriver 用于打开网站 (Helium 更高级的功能)
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.support import expected_conditions as EC
from selenium.common.exceptions import TimeoutException
```

`WebDriverWait`: 显示等待, 同样也是 `webdriver` 提供的方法。在设置时间内, 默认每隔一段时间检测一次当前页面元素是否存在, 如果超过设置时间检测不到则抛出异常。

默认检测频率为 0.5s, 默认抛出异常为: `NoSuchElementException`

`driver`: 传入 `WebDriver` 实例, 即我们上例中的 `driver`
`timeout`: 超时时间, 等待的最长时间 (同时要考虑隐性等待时间)
`poll_frequency`: 调用 `until` 或 `until_not` 中的方法的间隔时间, 默认是 0.5 秒
`ignored_exceptions`: 忽略的异常, 如果在调用 `until` 或 `until_not` 的过程中抛出这个元组中的异常, 则不中断代码, 继续等待,

如果抛出的是这个元组外的异常, 则中断代码, 抛出异常。默认只有 `NoSuchElementException`。

`EC.visibility_of_element_located(By.XPATH, "//div")` 判断某个 `locator` 元素是否可见。可见代表非隐藏、可显示, 并且元素的宽和高都大于 0

`EC.element_to_be_clickable(By.XPATH, "//div")` 判断某个 `locator` 元素是否可点击

`WebDriverWait(driver, 20).until(EC.element_to_be_clickable(NEXTBUTTON)).click()`

`until` 在等待期间, 每隔一段时间 (`__init__` 中的 `poll_frequency`) 调用这个传入的方法, 直到返回值不是 `False`
message: 如果超时, 抛出 `TimeoutException`, 将 message 传入异常
`until_not` 与 `until` 相反, `until` 是当某元素出现或什么条件成立则继续执行, `until_not` 是当某元素消失或什么条件不成立则继续执行, 参数也相同, 不再赘述。

初始化浏览器

`option = webdriver.ChromeOptions()` 返回驱动选项
`add_argument('--proxy-server=' + "'199.2.2.1:4455'")` 自动加上 `http://` 可以使用 `socks5://`
`add_argument('--disable-gpu')` 谷歌文档提到需要加上这个属性来规避 bug
`add_argument('--hide-scrollbars')` 隐藏滚动条, 应对一些特殊页面
`add_argument('--start-maximized')` 启动就最大化
`add_argument('--headless')` 浏览器不提供可视化页面. linux 下如果系统不支持可视化不加这条会启动失败
`add_argument('--user-agent=xxxxxxx')` 修改 HTTP 请求头部的 Agent 字符串
`add_argument('--lang=zh-CN')` 设置语言为简体中文
`add_argument('--user-data-dir="+r"C:/Users/Administrator/AppData/Local/Google/Chrome/User Data/")` 添加个人插件到浏览器中
`add_extension('assets/Tampermonkey.crx')` Add extension. (无头浏览器不可用)
`add_experimental_option('excludeSwitches', ['enable-automation'])` 以键值对的形式加入参数 (zim 验证)
`add_experimental_option("debuggerAddress", "127.0.0.1:9999")` 连接到已经打开的浏览器

```

desired_capabilities = option.to_capabilities() webdriver.DesiredCapabilities.CHROME.copy() 配置代理 //
print(self.driver.page_source) 查看代理生效
desired_capabilities['proxy'] = {
    "httpProxy": "199.2.2.1:4455",
    "noProxy": None,
    "proxyType": "MANUAL",
    "class": "org.openqa.selenium.Proxy",
    "autodetect": False
}
desired_capabilities["userAgent"] = "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"
driver= webdriver.Chrome(executable_path="C://chromedriver", options=option, desired_capabilities=desired_capabilities)
返回 driver
    execute_cdp_cmd('Page.addScriptToEvaluateOnNewDocument', {          去掉 navigator 验证
        'source': 'Object.defineProperty(navigator, "webdriver", {get: () => undefined})' # zim 验证
    })
    set_window_rect(900,50,1000,800) 窗口位置和宽高 x, y, width height
driver = webdriver.Remote("command_executor=self.sessionUrl") 控制远程已有浏览器

```

使用

```

from selenium.webdriver.common.by import By
from selenium.webdriver.common.proxy import Proxy
from selenium.webdriver.common.proxy import ProxyType
from selenium.webdriver.common.desired_capabilities import DesiredCapabilities
from selenium.webdriver import ActionChains

```

```

driver = webdriver.Remote("command_executor=self.sessionUrl", desired_capabilities)

```

current_window_handle	跳转前 获取当前窗口句柄
command_executor_url	会话地址 (回随机切换端口)
session_id	会话 id
get("http://www.baidu.com")	打开网站
refresh()	刷新页面
implicitly_wait(40)	5 秒钟内找到元素就往下执行, 否则抛出异常; (全局性)
switch_to.default_content()	回到主页面
set_window_size(1440, 900)	设置窗口大小
set_window_rect(22,33, 1440, 900)	设置窗口 xy 坐标和高 宽
set_page_load_timeout(3)	页面打开超时时间
switch_to.frame(frameElement)	定位到 iframe 元素上
switch_to.alert()	获取弹出对话框
save_screenshot('capture.png')	#全屏截图
execute_script("return var a=arguments[0]",999)	执行 js 代码, 通过 return 获取返回值
text()	获取对话框文本值
accept()	相当于点击 "确认"
dismiss()	相当于点击 "取消"
send_keys()	输入值 (alert 和 confirm 没有输入对话框, 所以就不用能用了, 只能使用在 prompt 里)
find_elements(By.TAG_NAME, "input")	

`find_element_by_css_selector('iframe')[1]` 通过 css 选择器选择出元素 (选出的元素可以继续调用 选择器方法)
`find_elements_by_class_name` 选出 多个元素
`find_elements_by_tag_name`
`find_elements_by_id`
`find_elements_by_link_text`
`find_elements_by_partial_link_text`
`find_elements_by_xpath('//*[@id="recaptcha-anchor"]/div[1]')` 或者 `.///*[@href and @lmv]`
`find_elements_by_xpath ('//div[@id="content" and @id="ul"]/ul[@id="ul"]/li/text())` 虚拟路径 使用 "@标签属性" 获

取 a 便签的 href 属性值

`//table[2]` 当前目录第二个 table
`//div[contains(@style,"xxx")][@type!="submit"])` 属性 style 包含 xxx type 不等于 submit
`//a[last()-1]` 倒数第二个
`./preceding-sibling::td[2]` (当前节点之前的节点) 或者 `following-sibling` (当前节点之后的节点)
`//div[@class='el-tab-pane' and not(contains(@style,'none'))]//button[./span[text()='确定']]` 不包含
`//tr[not(@id) and not(@class)]` 不包含属性
`./div[@class='el-tab-pane' and not(contains(@style,'none'))]`
`click()` 点击元素
`screenshot('ele.png')` #元素截图
`send_keys("123")` 用于在一个输入框内输入 XX 内容
`clear()` 清空输入框
`get_attribute("src");` 获取属性值
`send_keys(Keys.CONTROL, "a")`
`send_keys(Keys.DELETE)`

actions = ActionChains(driver);

`moveToElement(element).click().double_click().perform();` 执行链条

`action.key_down(Keys.CONTROL).send_keys('a').key_up(Keys.CONTROL).perform()` # ctrl+a

`actions.move_to_element(originInputEle).key_down(Keys.CONTROL).send_keys('a').key_up(Keys.CONTROL).send_keys(self.sourceReadData[self.currentDataIndex][0]).perform()`

`move_to_element(to_element)` ——鼠标移动到某个元素

其他

跳转到元素视区 方法 2

`JavascriptExecutor jse = (JavascriptExecutor)driver;`

`jse.executeScript("arguments[0].scrollIntoView()", WebElement);`

跳转后获取新句柄

`all_window=driver.window_handles`

for window in all_window:

if window != current_window:

driver.switch_to.window(window)

`current_window = firefox_login.current_window_handle` # 获取当前窗口 handle name

`browser.close()` # 关闭当前窗口 B

`driver.quit()` 退出 driver

使用上一个会话, 再次 get 不会重新打开浏览器

`driver2 = webdriver.Remote(command_executor=executor_url, desired_capabilities={})`

`driver2.session_id = session_id`

```
self.driver=driver2
self.execTimes=self.execTimes+1
修改 textarea 内容 (通过 js)
js = 'var ucode = document.getElementById("txarea_serial"); ucode.value=arguments[0]'
driver.execute_script(js,'123\t456\n789')
```

tensorflow

```
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout, MaxPooling2D
from tensorflow.keras.preprocessing.image import ImageDataGenerator
```

```
import os
import numpy as np
import matplotlib.pyplot as plt
```

1. 添加路径

```
train_dir = os.path.join(PATH, 'train')          训练路径 //EX: C:\train
validation_dir = os.path.join(PATH, 'validation') 验证路径 //EX: C:\validation
```

```
train_cats_dir = os.path.join(train_dir, 'cats')   猫训练 路径 //EX: C:\validation
train_dogs_dir = os.path.join(train_dir, 'dogs')   狗训练 路径 //EX: C:\validation
validation_cats_dir = os.path.join(validation_dir, 'cats') 猫验证 路径 //EX: C:\validation
validation_dogs_dir = os.path.join(validation_dir, 'dogs') 狗验证 路径 //EX: C:\validation
```

2. 查看图片数量

```
num_cats_tr = len(os.listdir(train_cats_dir))      猫训练 图片个数
num_dogs_tr = len(os.listdir(train_dogs_dir))      狗训练 图片个数

num_cats_val = len(os.listdir(validation_cats_dir)) 猫验证 图片个数
num_dogs_val = len(os.listdir(validation_dogs_dir)) 狗验证 图片个数

total_train = num_cats_tr + num_dogs_tr           总训练张数
total_val = num_cats_val + num_dogs_val           总验证张数
```

```
print('total training cat images:', num_cats_tr)
print('total training dog images:', num_dogs_tr)
```

```
print('total validation cat images:', num_cats_val)
print('total validation dog images:', num_dogs_val)
print("--")
print("Total training images:", total_train)
print("Total validation images:", total_val)
```

3. 使用 ImageDataGenerator 处理数据

```
batch_size = 128
```

```
epochs = 15
IMG_HEIGHT = 125
IMG_WIDTH = 125
train_image_generator = ImageDataGenerator(rescale=1./255)
```

matplotlib numpy

```
hstack()    平铺合并水平方向的数组
vstack()    在竖直方向上堆叠
```

apscheduler

```
from apscheduler.schedulers.blocking import BlockingScheduler
from apscheduler.schedulers.background import BackgroundScheduler
from apscheduler.jobstores.sqlalchemy import SQLAlchemyJobStore
import pymysql
pymysql.install_as_MySQLdb()
```

BlockingScheduler 调用 start 函数后会阻塞当前线程。当调度器是你应用中唯一要运行的东西时(如上例)使用。

BackgroundScheduler(timezone='Asia/Shanghai') 调用 start 后主线程不会阻塞。当你不运行任何其他框架时使用，并希望调度器在你应用的后台执行。

执行器

执行器的选择取决于应用场景。通常默认的 ThreadPoolExecutor 已经在大部分情况下是可以满足我们需求的。

如果我们的任务涉及到一些 CPU 密集计算的操作。那么应该考虑 ProcessPoolExecutor。然后针对每种程序，apscheduler 也设置了不同的 executor：

- ThreadPoolExecutor：线程池执行器。
- ProcessPoolExecutor：进程池执行器。
- GeventExecutor：Gevent 程序执行器。
- TornadoExecutor：Tornado 程序执行器。
- TwistedExecutor：Twisted 程序执行器。
- AsyncIOExecutor：asyncio 程序执行器。

任务存储

任务存储器的选择有两种。一是内存，也是默认的配置。二是数据库。

使用内存的方式是简单高效，但是不好的是，一旦程序出现问题，重新运行的话，会把之前已经执行了的任务重新执行一遍。

数据库则可以在程序崩溃后，重新运行可以从之前中断的地方恢复正常运行。有以下几种选择：

- MemoryJobStore：没有序列化，任务存储在内存中，增删改查都是在内存中完成。
- SQLAlchemyJobStore：使用 SQLAlchemy 这个 ORM 框架作为存储方式。
- MongoDBJobStore：使用 mongodb 作为存储器。
- RedisJobStore：使用 redis 作为存储器。

redis：

```
second_redis_jobstore = RedisJobStore(
    db=2,
    jobs_key="apschedulers.second_jobs",
    run_times_key="apschedulers.second_run_times",
    host="127.0.0.1",
    port=6379,
    password="test"
```

```

)

scheduler.add_jobstore(second_redis_jobstore, 'second')
mysql:
url="mysql+pymysql://user:passwd@host/dbname?charset=utf8"
job.scheduler.add_jobstore(jobstore="sqlalchemy",url=url,tablename='api_job')
sqlite:
jobstores = {
    'mongo': MongoDBJobStore(),
    'default': SQLAlchemyJobStore(url='sqlite:///jobs.sqlite')
}
executors = {
    'default': ThreadPoolExecutor(20),
    'processpool': ProcessPoolExecutor(5)
}
job_defaults = {
    'coalesce': False,
    'max_instances': 3
}
scheduler = BackgroundScheduler(jobstores=jobstores, executors=executors, job_defaults=job_defaults,
timezone=utc)

```

任务启动

```

scheduler.add_job(
    func=xxfunc,                执行的函数地址
    trigger="interval"
    name="ROUTEPRICE"          线程名
    id='xxjobid'                任务名

    seconds=20                  20s 执行一次（可以和其他参数叠加 minutes 等）
    minutes = 19                19m 执行一次
    hours = 17                  17h 执行一次
    days = 3d                   3d 执行一次

    misfire_grace_time = 20     超过用户设定的时间范围外 20s 时，该任务依旧执行，超出这个时间不执行(单位时间 s)。
    coalesce = True             进程挂掉时，导致任务多次没有调用，则前几次的累计任务的任务是否执行的策略。
    max_instances=3             同一个任务在线程池中最多跑的线程实例数（3 个线程 同时定时执行同一任务）
    next_run_time=datetime.datetime.now()    立刻执行
    __getstate__  获取 job 状态
scheduler.start()
scheduler.remove_job('xxjobid')  移除任务
scheduler.pause_job(job_id,jobstore=None)。    暂停任务
scheduler.resume_job(job_id,jobstore=None)。    恢复任务：
scheduler.modify_job(job_id,jobstore=None,**changes)。    修改某个任务属性信息
scheduler.reschedule_job(job_id,jobstore=None,trigger=None,**trigger_args)  修改单个作业的触发器并更新下次运行时间：
scheduler.print_jobs(jobstore=None,out=sys.stdout)    输出作业信息
scheduler.get_job('xxjobid')  打印 job 信息，没有返回 None

```

`scheduler.get_jobs()` 获取所有 job
`scheduler.print_jobs()` 打印所有的 job 信息
`scheduler.add_listener(SDK.taskListener,EVENT_JOB_EXECUTED | EVENT_JOB_ERROR | EVENT_JOB_MISSED)` 监听执行和执行失败事件

数据库

pymysql

```
import pymysql
import re

connection = pymysql.connect(          连接数据库
    host="localhost",
    port=3306,
    database="medicine",
    user="root",
    password="root",
    charset="utf8"
)
datamodel = connection.cursor()        获取数据库模型

sql = "INSERT INTO homework(id, title ) VALUES( %d, '%s' );" \
    % (1, pymysql.escape_string( " test " ) )    插入字符串需要提前处理
datamodel.execute(sql)                    执行 sql 语句
datamodel.fetchall()                      返回结果数据
connection.commit()                       提交修改
datamodel.close()                         关闭数据库模型
connection.close()

for (row,) in rows:
    print(row)
    curs.execute("insert into user (name, age) values (%s, %s)", ("Marsen", '26'))
    last_id = curs.lastrowid
db.insert_id()
只有在 user 表的主键是自增 id 的时候，而且在执行的 INSERT sql 语句中不能去自己去指定 id, 才能使用 curs.lastrowid 来获取新插入数据的 id。否则获取到的 id 都为 0。
```

SQLAlchemy

数据库 ORM(Object Relational Mapping) 对象-关系映射

pip install PyMySQL

```
import pymysql
pymysql.install_as_MySQLdb()          使用 pythone3 的 PyMsql
from sqlalchemy import create_engine
```

连接数据库

```
from sqlalchemy import create_engine
from sqlalchemy.orm import sessionmaker
```

```

from urllib import parse
password = parse.quote_plus(password) 解决密码包含特殊字符

engine = create_engine("mysql://user:password@hostname:3306/dbname?charset=utf8",
                        echo=True,          #当设置为 True 时会将 orm 语句转化为 sql 语句打印，一般 debug 的时候可用
                        pool_size=8,        # 连接池的大小，默认为 5 个，设置为 0 时表示连接无限制
                        pool_recycle=60*30  #设置时间以限制数据库多久没连接自动断开
                        )
dbengine.dispose() 关闭
创建 session:
    DbSession = sessionmaker(bind=engine)
    session = DbSession()

```

创建实体

```

from sqlalchemy.ext.declarative import declarative_base
from sqlalchemy.types import CHAR, Integer, String
from sqlalchemy import Column
Base = declarative_base()

class Person(Base):
    __tablename__ = "users"
    id = Column(Integer, primary_key=True)
    name = Column(String(64), unique=True)
    email = Column(String(64))

    def __init__(self, name, email):
        self.name = name
        self.email = email
    def drop_db():
        BaseModel.metadata.drop_all(engine)  # 删除数据表
    def create_db():
        BaseModel.metadata.create_all(engine)  # 创建数据库表
    def to_dict(self):
        return {c.name: getattr(self, c.name, None) for c in self.__table__.columns}

```

外键

```

class Parent(Base):
    __tablename__ = 'parent'
    id = Column(Integer, primary_key=True)
    children = relationship("Child", back_populates="parent")
    # Parent.children 是指的一个 Child 实例列表。

class Child(Base):
    __tablename__ = 'child'
    id = Column(Integer, primary_key=True)
    parent_id = Column(Integer, ForeignKey('parent.id'))
    # 当前外键关联到表'parent'
    parent = relationship("Parent", back_populates="children")
    # Child.parent 是指一个 Parent

```


使用

查询:

```
users = session.query(Users).filter_by(id=1).all()
for item in users:
    print(item.name)
q = session.query(User).filter(User.name.like('e%'))
session.query(User).filter(or_(User.name == 'jack', User.name == 'ed')).all()
```

新增:

```
add_user = Users("test", "test123@qq.com")
session.add(add_user)      # 把 Model 加入当前 session 维护的持久空间(可以从 session.dirty 看到)中, 直到 commit 时提交到
```

数据库

```
session.flush()           # 这样便可在 session 中 get 到对象的属性 // user_id=add_user.id
session.commit()
```

删除:

```
session.query(Users).filter(Users.name == "test").delete()
session.commit()
```

更新:

```
session.query(Users).filter_by(id=1).update({'name': "Jack"})
```

```
user = session.query(Users).filter_by(name="Jack").first()
user.name = "test"
session.add(user)
```

工具包

request_html

r.html.absolute_links 获取链接

r.html.links

jobs.text 获取文本

jobs.full_text

attrs = jobs.attrs 获取属性

attrs.get("key")

r.html.find('div#menu', first=True).text 查找 css 返回结果数组 【find, search 返回的都是封装 Element 元素, 只有 html 是标签元素】

selector , 要用的 CSS 选择器;

clean, 布尔值, 如果为真会忽略 HTML 中 style 和 script 标签造成的影响 (原文是 sanitize, 大概这么理解);

containing, 如果设置该属性, 会返回包含该属性文本的标签;

first, 布尔值, 如果为真会返回第一个元素, 否则会返回满足条件的元素列表;

_encoding, 编码格式。

attrs={"class": 'post_summary'}

r.html.search('把{}夹')[0] # 获取从 "把" 到 "夹" 字的所有内容

pipenv

包管理工具

parse

parse("The {} who {} {}", "The knights who say Ni!") 匹配内容 <Result ('knights', 'say', 'Ni!') {}>

pillow

from PIL import Image 用于打开图片和对图片处理

```
import io
```

```
Image.open(r"D:\a.png")    返回图片对象
size                        获取图片大小 //EX: w, h =img.size
getpixel((x,y))            得到某个位置的像素，对应从左上角开始的宽高 x, y //EX: r,g,b = img.getpixel((x,y))
convert("L")                【1 为二值图像，非黑即白。但是它每个像素用 8 个 bit 表示，0 表示黑，255 表示白】
                             【L 为灰色图像，它的每个像素用 8 个 bit 表示，0 表示黑，255 表示白，其他数字表示不
                             同的灰度。】
```

在 PIL 中，从模式“RGB”转换为“L”模式是按照下面的公式转换的： $L = R * 299/1000 + G * 587/1000 + B * 114/1000$ 】

```
show()                      显示图片
thumbnail((width/10, height/10))
resize((100,100), Image.ANTIALIAS)    重新缩放大小，返回新图片
save(xxximgByteArr | xxpath, format='JPEG', quality=95)    Image 格式转为 bytes 字节流格式，或保存到路径
                             【quality 参数：保存图像的质量，值的范围从 1 到 95。默认值为 75，使用中应尽量避免高于 95 的值; 100 会禁用部分 JPEG
                             压缩算法，并导致大文件图像质量几乎没有任何增益。】
```

```
// imgByteArr = io.BytesIO()    save(imgByteArr)
```

```
imgByteArr = imgByteArr.getvalue()
```

opencv-python

```
import cv2 as cv    打开图片和图像处理
```

pytesseract

图片转文字（tesseract 添加环境变量 TESSDATA_PREFIX）

```
pytesseract.pytesseract.tesseract_cmd = tesseractPath # 设置 pytesseract 路径
```

urllib3

```
from urllib3 import request
```

```
request.urlopen()
```

```
read() readline() ,readlines() , fileno() , close()    对 HTTPResponse 类型数据进行操作
```

```
info()    返回 HTTPMessage 对象，表示远程服务器返回的头信息
```

```
getcode() 返回 Http 状态码。如果是 http 请求，200 请求成功完成;404 网址未找到
```

```
geturl()    返回请求的 url
```

demjson

```
demjson.encode(self, obj, nest_level=0)    对象转 j 串
```

```
demjson.encode(data)    json 转 j 串
```

```
demjson.decode(self, txt)    j 串 转 json
```

numpy

```
import numpy as np    读取二进制图片
```

```
nparr = np.asarray(bytearray(image_bytes), dtype="uint8")    数组转换为 np 数组
```

```
image = nparr.reshape((960, 540)) # (height, width)
```

```
im = Image.fromarray(image, mode="L")
```

opencv-python

```
pred_img = cv2.resize(nparr,(28,28))
```

xlsxwriter

```
worksheet.set_row()
```

```
cell_format = workbook.add_format({'bold': True})
```

```
set_row(row, height, cell_format, options)
```

xlrd 1.2.0

```
rbXlsx=xlrd.open_workbook(writeFile)
wbXlsx=copy(rbXlsx)
wbXlsx.write(1,3,"some text")
os.remove(writeFile)
wbXlsx.save(writeFile)
    cell = sheetFile.cell(rowInd, newNameInd)
    targetStr=cell.value
    if cell.ctype == 2 and cell.value % 1 == 0:
        targetStr = int(cell.value)
    print('[EXCEL UTIL] float data',targetStr)
```

xlwt

xlutils

```
xlutils.copy(xlsxObj)  返回一个打开的 xlsx    // xlrd.open_workbook("path")
```

openpyxl

openpyxl: 对 excel 文件的打开、读写、编辑、保存相关

pandas

```
data = pandas.read_csv(numPath,encoding='gb18030')
# 必须添加 header=None, 否则默认把第一行数据处理成列名导致缺失
list = data.values.tolist()
```

pytz

pytz: 常用于时区的转换

baidu-aip

aip: 百度 ocr 识别文字

poplib

```
from email.parser import Parser
from email.header import decode_header
from email.utils import parseaddr
import poplib
```

```
email = 'saidake@qq.com'      # 输入邮件地址, 口令和 POP3 服务器地址:
password = 'quatvbcmlzymcabi' # 这个密码不是邮箱登录密码, 是 pop3 服务密码
pop3_server = 'pop.qq.com'
```

```
def guess_charset(msg):
    charset = msg.get_charset()
    if charset is None:
        content_type = msg.get('Content-Type', '').lower()
        pos = content_type.find('charset=')
        if pos >= 0:
            charset = content_type[pos + 8:].strip()
    return charset
```

```
def decode_str(s):
    value, charset = decode_header(s)[0]
    if charset:
```

```

        value = value.decode(charset)
    return value

def print_info(msg, indent=0):
    if indent == 0:
        for header in ['From', 'To', 'Subject']:
            value = msg.get(header, '')
            if value:
                if header == 'Subject':
                    value = decode_str(value)
                else:
                    hdr, addr = parseaddr(value)
                    name = decode_str(hdr)
                    value = u'%s <%s>' % (name, addr)
                print('%s%s: %s' % (' ' * indent, header, value))
    if (msg.is_multipart()):
        parts = msg.get_payload()
        for n, part in enumerate(parts):
            print('%spart %s' % (' ' * indent, n))
            print('%s-----' % (' ' * indent))
            print_info(part, indent + 1)
    else:
        content_type = msg.get_content_type()
        if content_type == 'text/plain' or content_type == 'text/html':
            content = msg.get_payload(decode=True)
            charset = guess_charset(msg)
            if charset:
                content = content.decode(charset)
            print('%sText: %s' % (' ' * indent, content + '...'))
        else:
            print('%sAttachment: %s' % (' ' * indent, content_type))

```

```

# 连接到 POP3 服务器:
server = poplib.POP3_SSL(pop3_server, 995)
# 可以打开或关闭调试信息:
server.set_debuglevel(1)
# 可选:打印 POP3 服务器的欢迎文字:
print(server.getwelcome().decode('utf-8'))
# 身份认证:
server.user(email)
server.pass_(password)
# stat()返回邮件数量和占用空间:
print('Messages: %s. Size: %s' % server.stat())
# list()返回所有邮件的编号:
resp, mails, octets = server.list()
# 可以查看返回的列表类似[b'1 82923', b'2 2184', ...]
print(mails)
# 获取最新一封邮件, 注意索引号从 1 开始:

```

```

index = len(mails)
print('未读邮件的数量',index)
resp, lines, octets = server.retr(index)
# lines 存储了邮件的原始文本的每一行,
# 可以获得整个邮件的原始文本:
msg_content = b'\r\n'.join(lines).decode('utf-8')
# 稍后解析出邮件:
msg = Parser().parsestr(msg_content)
msg.get_payload(decode=True)    获取邮件体
print_info(msg)
# 可以根据邮件索引号直接从服务器删除邮件:
# server.dele(2)
# 关闭连接:
server.quit()

```

scrapy

命令

```

scrapy startproject mypro          创建项目
scrapy genspider myspider www.baidu.com  创建爬虫
scrapy list    查看项目有几个爬虫

```

settings.py

```

LOG_LEVEL = "DEBUG" # 输出级别
LOG_STDOUT = true # 是否标准输出
    CRITICAL -- 关键错误
    ERROR -- 一般级别的错误
    WARNING -- 警告信息
    INFO -- 信息消息的日志 (建议生产模式使用)
    DEBUG -- 调试消息的日志 (建议开发模式)

ITEM_PIPELINES = {
    'heartsong.pipelines.HeartSongPipeline': 300,    注册管道并定义优先级
}

```

one.py

```

import scrapy
from ..items import OneStatusItem

```

class OneSpider(scrapy.Spider):

```

    name = 'one'
    allowed_domains = ['www.baidu.com']
    start_urls = ['http://www.baidu.com/']
    def start_requests(self):
        request = scrapy.Request( url, method='POST',
                                   body=json.dumps(my_data),
                                   headers={'Content-Type':'application/json'})
    def parse(self, response):    处理相应
        response.url
        status
        headers
        body

```

```
request
meta
flags
urljoin(url)
text
encoding
selector
xpath
css
body_as_unicode
```

main.py

```
from scrapy.crawler import CrawlerProcess
from scrapy.utils.project import get_project_settings

# 根据项目配置获取 CrawlerProcess 实例
process = CrawlerProcess(get_project_settings())

# 添加需要执行的爬虫
process.crawl('one')
# process.crawl('dining')
# process.crawl('experience')

# 执行
process.start()
```

python main.py

mitmdump

```
http://mitm.it/    检测请求是否通过了 mitmproxy
rich
```

Python / adb

```
adb devices          查看连接设备
adb shell pm list packages    显示所有包名
adb shell dumpsys activity activities    显示活动程序
adb shell input tap 10 10    点击
adb shell input swipe x_start y_start x_end y_end    滑动
adb shell input text xxx    输入文字信息
adb shell input keyevent X    3 对应的是 HOME 键    24 对应的是音量+    25 对应的是音量-    66 对应的是确认键
adb shell getevent    监听手机事件    0003 0035 xx    0003 0036 yy
adb shell screencap -p /sdcard/autolottery.png    ADB 截取屏幕
adb pull /sdcard/autolottery.png ./img    第一个路径是手机中文件的路径和文件名，后一个路径是存放在电脑中的路径（./img 表示存在当前 py 文件目录下的 img 文件夹里）
```

