Python for Text Analysis 2018-2019

Lecture 2: Strings, Booleans and if-statements
01-11-2018

Today’s class

- **First half:** Theory
  - Questions so far?
  - Some notes about Notebooks
  - Chapter 3: Strings
  - Chapter 4: Boolean Expressions and Conditions
- **Second half:** Working on assignment
  - Room MF-A307
  - Room MF-A115 (optional)

Slides can be found on **Github > Slides** and on **Canvas > Files**.

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Some notes about Notebooks

- Behind every notebook runs a **kernel** (can be seen as the whole document)
  - When you run a code cell, that code is executed within the kernel
  - Any output is returned back to the cell to be displayed

- The kernel's state persists **over time** and **between cells**
  - If you **declare variables** in one cell, they will be **available** in another
  - Similarly, these variables will **remain in memory** even if you **renamed variables** and execute the cell again (this happens a lot...!)

- To **test your code** (or possibly fixing problems that seem unrelated to the code in your cell), it may be useful to reset things:
  - **Restart:** restarts the kernel, thus clearing all the variables etc. that were defined.
  - **Restart & Clear Output:** same as above but will also wipe the output displayed.
  - **Restart & Run All:** same as above but will also run all your cells in order from first to last.

CHAPTER 3:

Strings

Strings

- Strings are created with **quotes** (‘ or “)
- Strings are **sequences** of characters
  - Each character has a **positive index** and a **negative index**
- Strings are **immutable**
  - You are **not** allowed to **modify** the individual characters in the string

```
my_string = “Hello”
my_string = ‘Hello’
```

H	e	l	l	o
0	1	2	3	4
-5	-4	-3	-2	-1

String indices

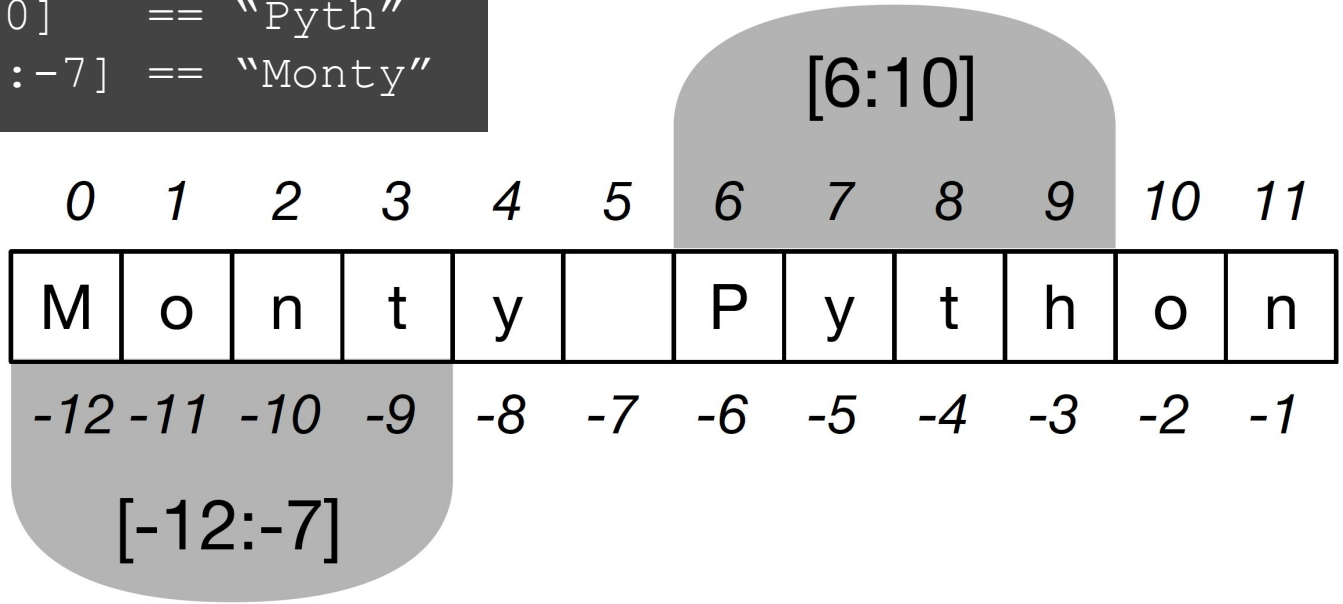
- We can **access characters** in a string using their **indices**
  - **First character:** index = 0
  - **Last character:** index = -1

```
my_string[0] == "H"
my_string[1] == "e"
my_string[-4] == "e"
```

String slicing

- We can also extract **a range** from a string

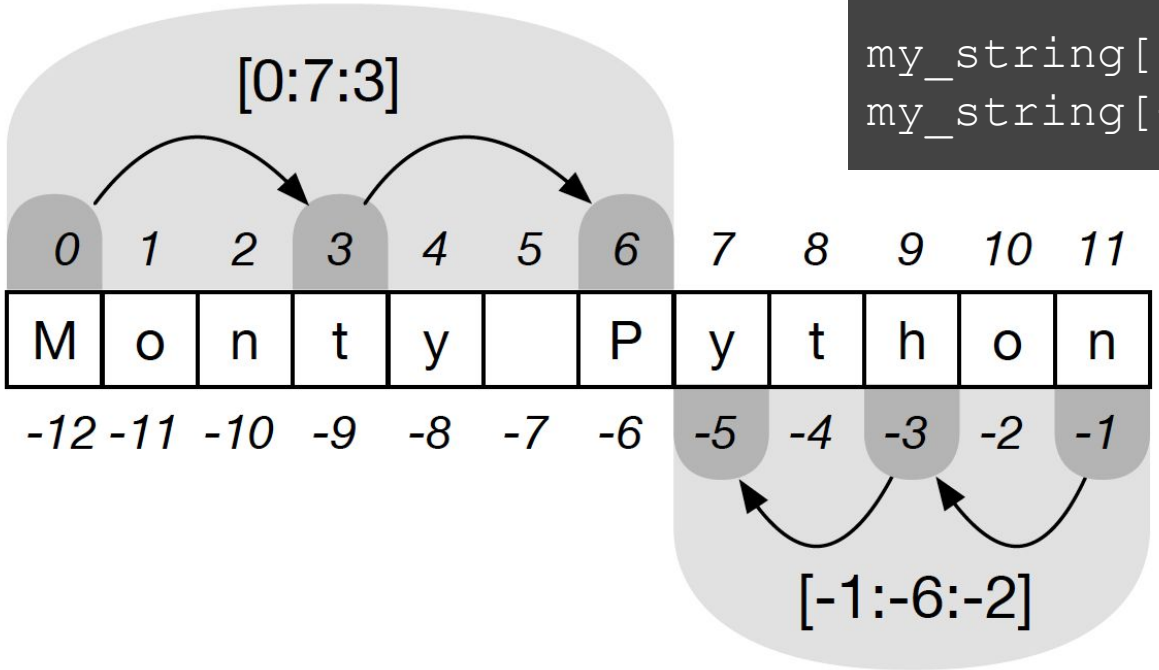
```
my_string[6:10]    == "Pyth"
my_string[-12:-7] == "Monty"
```



String slicing

- We can also extract **a range** from a string using a specific **step size**

```
my_string[0:7:3]     == "MtP"
my_string[-1:-6:-2] == "nhy"
```



String are immutable

- You are **not** allowed to **modify** the individual characters in the string
- Instead, you should create a **new string** based on the **old string**
  - For example, by using `str.replace()` or by concatenation

```
my_string = "cat"
my_string[0] = "f"
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-4-5b2a04c5d3c4> in <module>()
      1 my_string = "cat"
----> 2 my_string[0] = "f"

TypeError: 'str' object does not support item assignment
```

```
my_string = "cat"
my_string = "f" + my_string[1:]
print(my_string)
```

```
fat
```

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String concatenation and formatting

- Sometimes we want to **combine** strings
  - for printing
  - for creating a new string
- Several ways to achieve this:
  - using the **`print()` function with commas**
  - **concatenating** strings using:
    - the + sign
    - the * sign
  - **interpolating** strings using **string formatting:**
    - f-strings (recommended for Python 3.6+)
    - %-formatting
    - .format()

Printing multiple objects with commas

```
first_name = "Monty"
second_name = "Python"
print(first_name, second_name)
```

```
Monty Python
```

```
number = 3
product = "oranges"
print(number, product)
```

```
3 oranges
```

`print()` function

- prints all objects to the screen separated by space (default)
- does not create a new string

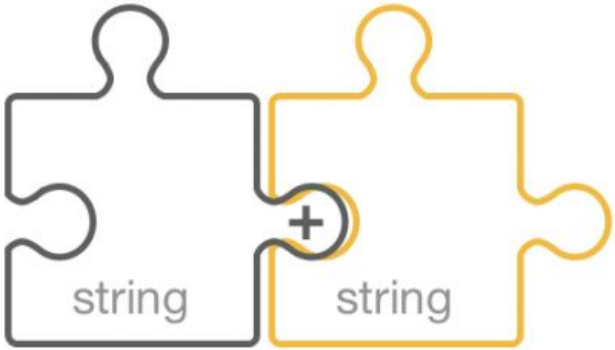
Concatenating strings using the + sign

```
first_name = "Monty"
last_name = "Python"
full_name = first_name + last_name
print(full_name)
```

```
MontyPython
```

```
name = "Monty"
name += "Python"
print(name)
```

```
MontyPython
```



+ makes a new string
+ does not use a delimiter

Concatenating strings using the + sign

```
x = 20
y = "18"
print(str(x) + y)
```

```
2018
```

```
x = 20
y = "18"
print(x + int(y))
```

```
38
```

```
x = 20
y = "18"
print(x + y)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-29-27f7d79bbd92> in <module>()
      1 x = 20
      2 y = "18"
----> 3 print(x + y)

TypeError: unsupported operand type(s) for +: 'int' and 'str'
```

+ is interpreted based on type

Repeating strings using the * sign

```
x = 3
y = 'very '
z = 'hot'
print(x * y + z)
```

```
very very very hot
```

```
x = 3
y = 5
print(x*y)
```

```
15
```

* is interpreted based on type

Interpolating strings using f-strings (string formatting)

```
n = 3
print(f"{n} oranges, please")
```

```
3 oranges, please
```

```
n = 3
price = 0.25
print(f"That will be €{n*price}, then")
```

```
That will be €0.75, then
```

f-strings

- can execute code in-place
- convert all objects to strings

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String functions and methods

len(s)	Returns the length (number of characters) of string s
s.find(x)	Find the first position of substring x in string s
s.count(x)	Count the number of times substring x is in string s
s.upper() s.lower()	Returns a string that is all uppercase or lowercase
s.replace(x, y)	Returns a new string where the substring x has been replaced by the substring y
s.startswith(x) s.endswith(x)	Returns True if string s starts/ends with substring x, otherwise returns False

String methods

- Some methods take **input arguments**, others do not
- More about arguments in block 2
- For now, remember that:
  - you can **call `help()`** to find out about input arguments
  - Python will throw a **TypeError** if you don't provide an **obligatory argument**

```
help(str.count)
```

```
Help on method_descriptor:

count(...)
    S.count(sub[, start[, end]]) -> int

    Return the number of non-overlapping occurrences of substring sub in
    string S[start:end].  Optional arguments start and end are
    interpreted as in slice notation.
```

what to count?

```
my_string = "hello"
my_string.count()
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-7-afa5043439f0> in <module>()
      1 my_string = "hello"
----> 2 my_string.count()

TypeError: count() takes at least 1 argument (0 given)
```

String methods

- String methods only **return** the result; they do **not change** the string itself
  - Remember: strings are **immutable**

```
my_string = "cat"
my_string.replace("c", "f")
print(my_string)
```

```
cat
```

```
my_string = "cat"
my_string = my_string.replace("c", "f")
print(my_string)
```

```
fat
```

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&&	!alive	alive
!dead		
dead		

CHAPTER 4:

Boolean Expressions and Conditions

Boolean Expressions and Conditions

- There are two Boolean values: **True** and **False** (type = `bool`)
- **Boolean expressions** result in one of these

RESULTING IN **TRUE**

```
3 == 3
3 < 5
"H" in "Hello"
```

RESULTING IN **FALSE**

```
3 == 5
3 > 5
"P" in "Hello"
```

- Boolean expressions can be used as **conditions** in **if-elif-else constructs**

Comparison operators

- **Comparison operators** compare the **values on either sides** of them and decide the **relation** among them

operator	meaning	True	False
`==`	equal	`2 == 2`	`2 == 3`
`!=`	not equal	`3 != 2`	`2 != 2`
`<`	less than	`2 < 13`	`2 < 2`
`<=`	less than or equal	`2 <= 2`	`3 <= 2`
`>`	greater than	`13 > 2`	`2 > 13`
`>=`	greater than or equal	`3 >= 2`	`2 >= 3`

Membership operators

- **Membership operators** test for **membership** in a **sequence**, such as strings, lists, or tuples

operator	meaning	True	False
`in`	left object is a member of right object	`"fun" in "function"`	`"I" in "team"`
`not in`	left object is NOT a member of right object	`"I" in "team"`	`"fun" in "function"`

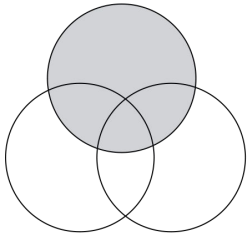
AND, OR & NOT

operator	meaning	True	False
bool1 `and` bool2	`True` if both **bool1** and **bool2** are `True`, otherwise `False`	`5 == 5 and 3 < 5`	`5 == 5 and 3 > 5`
bool1 `or` bool2	`True` when at least one of the boolean expressions is `True`, otherwise `False`	`5 == 5 and 3 > 5`	`5 != 5 and 3 > 5`
`not` bool1	`True` if bool1 is `False`, otherwise `False`	`not 5 != 5`	`not 5 == 5`

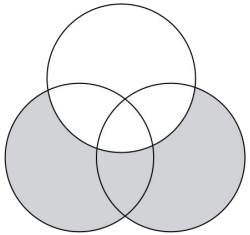
AND, OR & NOT

```
A = "Johnny Depp" in movie
B = "Helena Bonham-Carter" in movie
C = "Alan Rickman" in movie
```

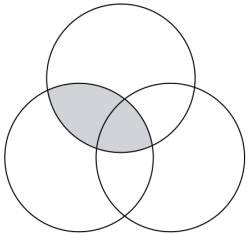
Can you understand which (hypothetical) movies each boolean expression would express?



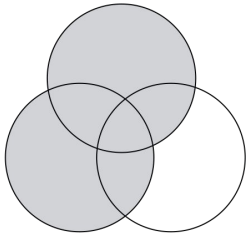
A



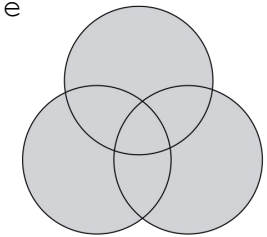
Not A



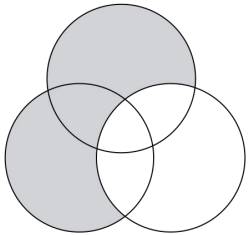
A And B



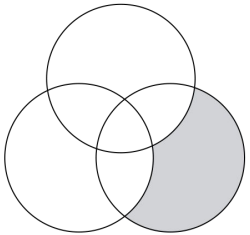
A Or B



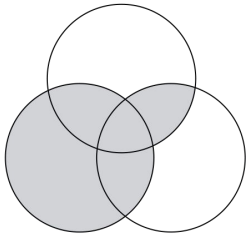
A Or B Or C



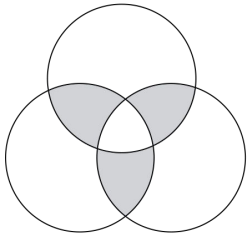
(A Or B) and Not C



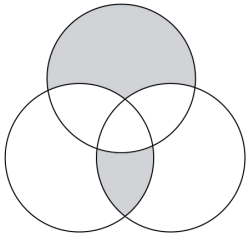
C And Not A and Not B



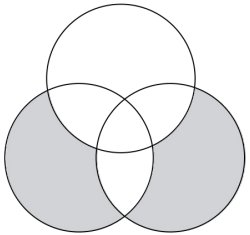
B Or (C And A)



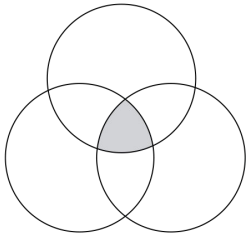
(A And B) Or
(B And C) Or (A And C)



((B And C) and Not A) Or
(A and Not B and Not C)

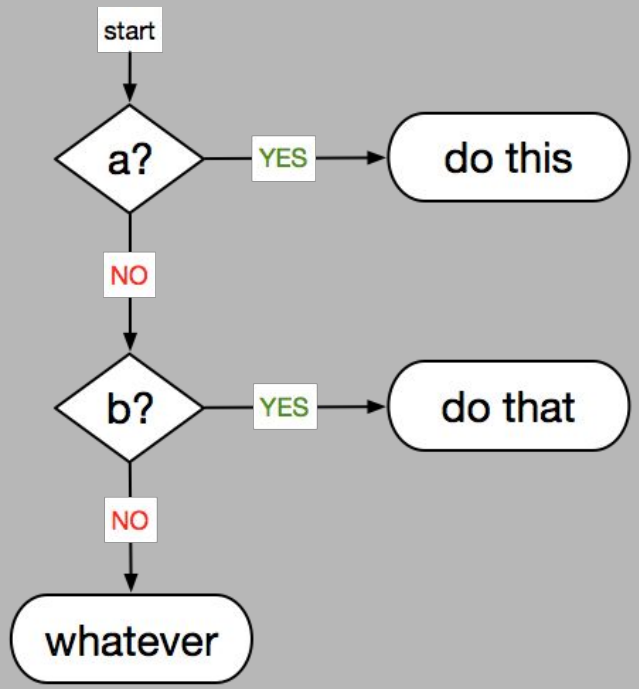


(B and Not C) Or
(C and Not B)



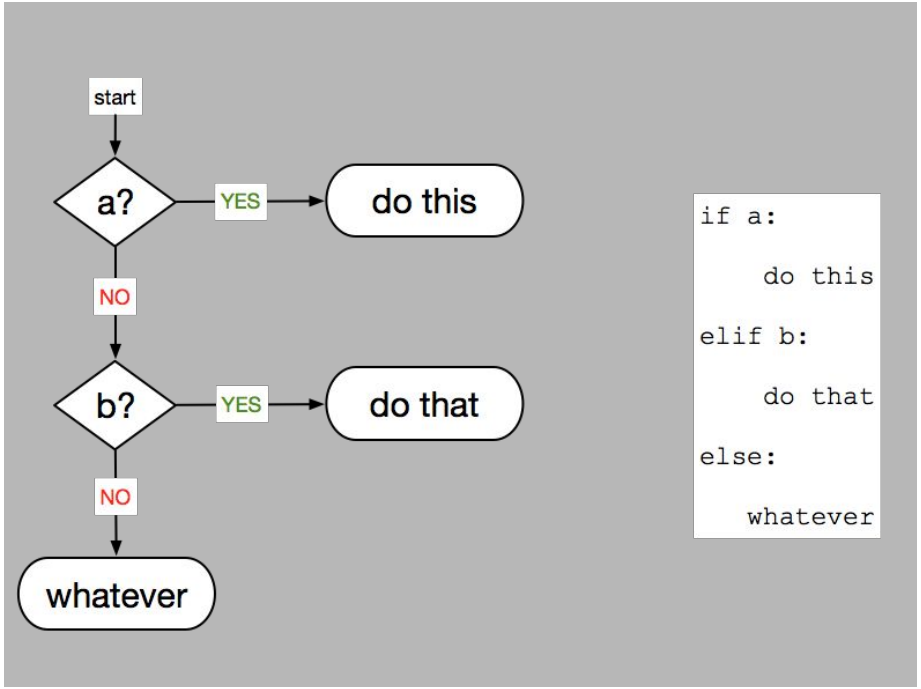
A And B And C

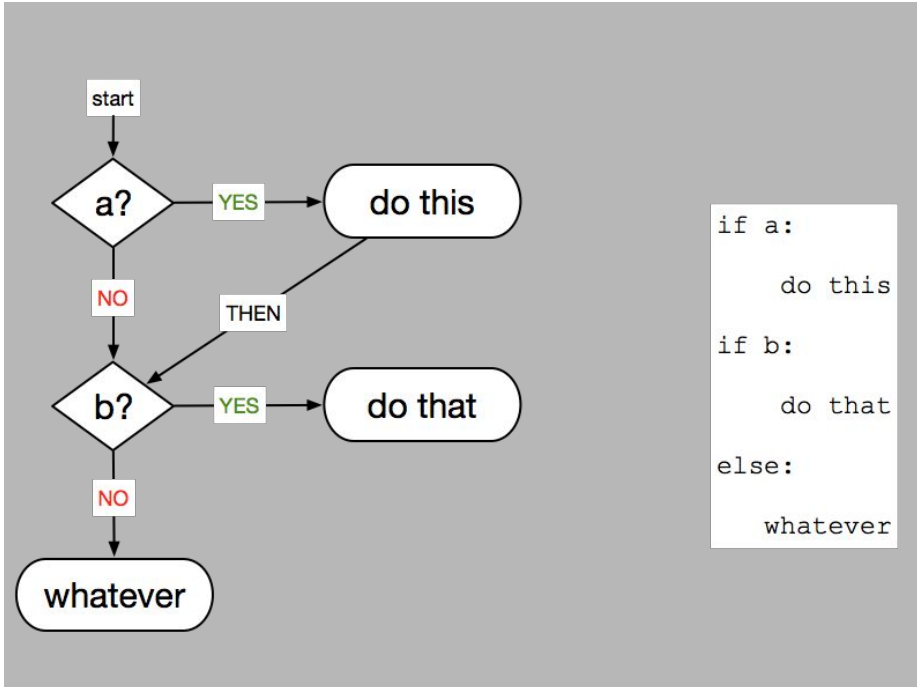
If - elif - else



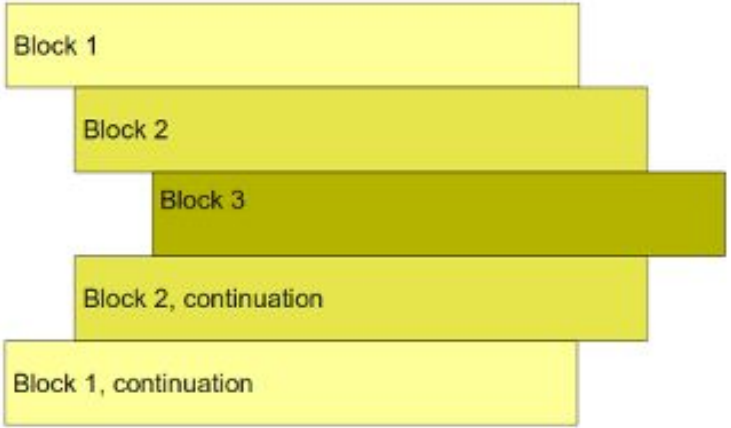

```
if a:
    do this
elif b:
    do that
else:
   whatever
```

Difference between if-elif and if-if





Indentation & Nesting



DON'T DO:

```
if "h" in "hello":
print("bye")
```

INSTEAD, DO:

```
if "h" in "hello":
    print("bye")
```

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Next week

- **Tomorrow before 23:59:** submit Assignment 1
- **Monday:** feedback session (no preparation needed)
- **Thursday:** start with Block 2