

CS 1340 Introduction to Computing Concepts

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Feb 4 2020, Lecture 5



Agenda



- Agenda:
 - Quick review of concepts from last lecture
 - Functions and modules

Python loops

- if statements allow you to execute different piece of code based on the different situations (conditional test)
- Loops allow you to execute the same piece of code multiple times
- Python has two primitive loop commands
 - **while** loops
 - **for** loops

While loop

- while loop syntax

indentation (4 spaces)  *while conditional_test:* **colon** 
 do something
 then do something

- It will keep execute the code block as long as the conditional test is true.
- usually you will need to modify the the values used in the conditional test once some conditions are met

for loop

- For-each is Python's **only** form of for loop, this is less like the **for** keyword in other programming languages.
- A **for** loop steps through each of the items in a collection type (list, dictionary, etc) or any other type of object which is "iterable" (remember when we call `.keys()` method of a dictionary)
- Often used with lists and dictionaries

indentation (4 spaces)



```
for <each item> in <collection>:  
    <statements>
```

colon



while/for loops

- Using **break** to exit a loop
 - To exit a loop immediately without running any remaining code in the loop
- Using **continue** in a loop
 - Rather than breaking out of a loop entirely without executing the rest of its code, you can use the **continue** statement to return to the beginning of the loop based on the result of a conditional test

Avoid infinite loops

- Avoid infinite loops when using While

```
1 x = 1
2 while x <= 5:
3     print(x)
4     x += 1
```

while_loops x

```
/Users/xinyi/anaconda/envs/mlearn/bin/python /Users/xinyi/Courses/cs1340/week2/while_loops.py
1
2
3
4
5

Process finished with exit code 0
```

- Might not be an issue using for loop
 - It iterates through each element in a collection (or any object that is iterable) until the end.

for loop Demo

DEMO

List Comprehensions

- A powerful feature of the Python language
 - Generate a new list by applying a function to every member of an original list
 - Python programmers use list comprehensions extensively. You'll see many of them in real code

[expression for item in list]

List Comprehensions

```
1 li = [3, 6, 2, 7]
2 new_list = [elem*2 for elem in li]
3 print(new_list)
4
```

loops ×

/Users/xinyi/anaconda/envs/mlearn/bin/python /Users/xinyi/Courses/cs1340/week3/loops.py

[6, 12, 4, 14]

Process finished with exit code 0

[**expression** for **item** in **list**]

- Where **expression** is some calculation or operation acting upon the variable **item**.
- For each member of the **list**, the list comprehension
 - sets **item** equal to that member, and
 - calculates a new value using **expression**.
- It then collects these new values into a list which is the return value of the list comprehension.

Filtered List Comprehensions

[**expression** for **item** in **list** if **filter**]

- **Filter** determines whether **expression** is performed on each member of the **list**
- When processing each element of **list**, first check if it satisfies the **filter condition**
- If the **filter condition** returns False, that elements is omitted from the **list** before the list comprehension is evaluated.

Filtered List Comprehensions

[**expression** for **item** in **list** if **filter**]

```
1 li = [3, 6, 2, 7]
2 new_list = [elem*2 for elem in li if elem > 3]
3 print(new_list)
4
```

loops ×

```
/Users/xinyi/anaconda/envs/mlearn/bin/python /Users/xinyi/Courses/cs1340/week3/loops.py
[12, 14]
```

Process finished with exit code 0

Nested List Comprehensions

- Since list comprehensions take a list as input and produce a list as output, they are easily nested:
- Self-test: what do you think the nested_li will be?

```
li = [3, 2, 4, 1]
nested_li = [elem*2 for elem in
             [item+1 for item in li]]
```

Nested List Comprehensions

```
1 li = [3, 2, 4, 1]
2 nested_li = [elem*2 for elem in
3   [item+1 for item in li]]
4
5 print(nested_li) |
```

```
loops x
/Users/xinyi/anaconda/envs/mlearn/bin/python /Users/xinyi/Courses/cs1340/week3/loops.py
[8, 6, 10, 4]

Process finished with exit code 0
```

- The inner comprehension produces: [4, 3, 5, 2]
- So, the outer one produces: [8, 6, 10, 4]