Combining List

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01

Copying List

Introduction

In Python, lists are **mutable** objects, meaning they can be changed after creation. When working with lists, you might want to create a separate copy to avoid unintended modifications.

There are multiple ways to **copy a list**, like:

- Using **list**() function
- Using the **copy**() method
- Using **slice** notation

Using list() function

I have a question for you…what do you think…what will be the output of the following code?

Python

```
original_list = [1, 2, 3]
copied_list = original_list
copied_list.append(4)

print(original_list)
```

Output

```
[1, 2, 3, 4]
```

Using list() function

The original list has changed…
But **WHY**?

Reason:
Both **original_list** and **copied_list** refer to the *same* list. Any changes made to one affect the other.

If you assign one list to another using **=**, it doesn't create a new list. Instead, both variables will point to the same list in memory.

Python

```
original_list = [1, 2, 3]
copied_list = original_list
copied_list.append(4)

print(original_list)
```

Output

```
[1, 2, 3, 4]
```

Using list() function

So is it *IMPOSSIBLE* to make a list using b = a?

Answer:
NO.
You just need to use **list()** function.

Python	**Output**
`original_list = [1, 2, 3]`	
`copied_list = list(original_list)`	
`copied_list.append(4)`	`[1, 2, 3]`
	`[1, 2, 3, 4]`
`print(original_list)`	
`print(copied_list)`	

Using .copy() method

You can also use something else called **.copy()** method.

The **copy()** method is a built-in list method and it is recommended for simple lists

Python	Output

```
original_list = [1, 2, 3]
copied_list = original_list.copy()
copied_list.append(4)

print(original_list)
print(copied_list)
```
	```
	[1, 2, 3]
	[1, 2, 3, 4]
	```

Using slice notation

Slicing a list using **[:]** creates a shallow copy of the list.

Python	Output
`original_list = [1, 2, 3]`	
`copied_list = original_list[:]`	
`copied_list.append(4)`	`[1, 2, 3]`
	`[1, 2, 3, 4]`
`print(original_list)`	
`print(copied_list)`	

Shallow Copy Vs Deep Copy

Shallow copy and deep copy can be confusing but actually, it is simple. Let me explain.

Shallow Copy	**Deep Copy**
A **shallow copy** only copies the outermost list, meaning if the list contains other lists (nested lists), they are not fully copied.	A **deep copy** creates a completely independent copy, including all nested lists.

Deep Copy

- If a list contains **nested lists**, a simple copy might not work as expected. This is because inner lists remain linked.

- To perform a deep copy, use the built-in **copy** module's **deepcopy()** function.

Python	Output

`import copy`
 	
`original_list = [[1, 2], [3, 4]]`
`copied_list = copy.deepcopy(original_list)`
`copied_list[0].append(5)`
 	
`print(original_list`
`print(copied_list)`
	`[[1, 2], [3, 4]]`
	`[[1, 2, 5], [3, 4]]`

Summary

- Assignment (**=**) doesn’t create a real copy, just a new reference.
- Use **“.copy()”**, **“= with list() function”** and **“Slicing Notation [:]”** for simple lists.
- For nested lists, use **copy.deepcopy**() to avoid unexpected changes.

02

Joining List

Introduction

- Joining lists means **merging multiple lists into one**.

→ There are multiple ways to **Join** Lists:

- **'+' Operator** → Creates a new list.
- **.extend()** → Adds elements to an existing list.
- **.append()** → Combined with loop to add element to an existing list.
- **List Comprehension** → Merges with customization.

Using ‘+’ Operator

- The simplest way to join two or more lists is by using the **+** operator.
- This method creates a new list that contains elements from all the lists.

Python	**Output**

`list1 = [1, 2, 3]`
`list2 = [4, 5, 6]`
`joined_list = list1 + list2`
`print(joined_list)`
	`[1, 2, 3, 4, 5, 6]`

Using extend() Method

- The **extend()** method adds elements from one list to the end of another list in place.

- Unlike **+**, it modifies the original list.

Python	Output

`list1 = [1, 2, 3]`
`list2 = [4, 5, 6]`
`list1.extend(list2)`
`print(list1)`
	`[1, 2, 3, 4, 5, 6]`

Using append() Method

- The **append()** method adds elements to the end of another list one by one using loop.
- This function **modifies** the original list by adding the element to the end of the list.

Python

```python
list1 = ["a", "b" , "c"]
list2 = ["d", "e" , "f"]

for x in list2:
  list1.append(x)

print(list1)
```

Output

```
['a', 'b', 'c', 'd', 'e', 'f']
```

Using List Comprehension

- You can use list comprehensions to **join** lists in a **more customizable way.**
- It is used to **generate new lists** by applying an **expression** to each item in an existing iterable.

Python	Output

`list1 = [1, 2, 3]`
`list2 = [4, 5, 6]`
 	
`merged_list = [item for sublist in [list1, list2] for item in sublist]`
 	
`print(merged_list)`
	`[1, 2, 3, 4, 5, 6]`

Using List Comprehension

- You can use list comprehensions to **join** lists in a **more customizable way.**

- It is used to **generate new lists** by applying an **expression** to each item in an existing iterable.

Python	Output

`list1 = [1, 2, 3]`
`list2 = [4, 5, 6]`
 	
`merged_list = [item for sublist in [list1, list2] for item in sublist]`
 	
`print(merged_list)`
	`[1, 2, 3, 4, 5, 6]`

- First loops through **each list** (list1 and list2).

- Then extracts **each element** and places it in merged_list.

Summary

- Use the **+ operator** for simple and quick concatenation.
- Use the **extend() & append()** method when you need to modify a list in place.
- Use **list comprehensions** for more control over how lists are joined.

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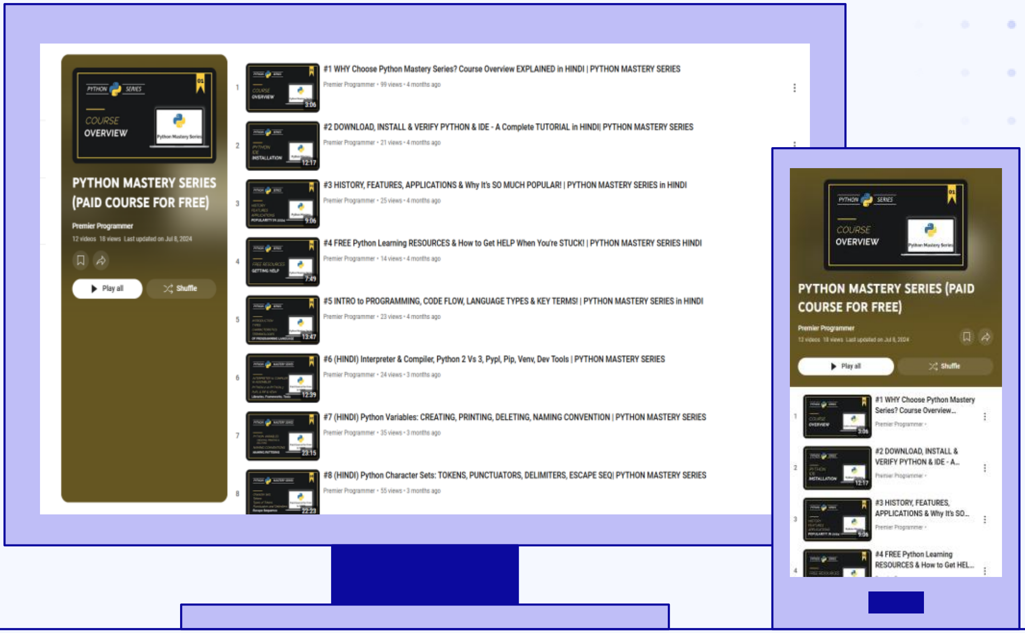

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