PYTHON SNIPPETS

Python Itertools Part 2 - Combinations & Permutations

Phil Best
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In our last snippet post we a quick look at the `product` function found in the `itertools` module. Today we're going to look at a few more combinatoric iterators from the `itertools` module: `permutations`, `combinations`, and `combinations_with_replacement`.

First, let's look at `permutations`. `permutations` is concerned with finding all of the possible orderings for a given collection of items. For example, if we have the string `"ABC"`, permutations will find all of the ways we can reorder the letters in this string, so that each order is unique.

```
from itertools import permutations

p_1 = permutations("ABC")
# ('A', 'B', 'C') ('A', 'C', 'B') ('B', 'A', 'C') ('B', 'C', 'A')
# ('C', 'A', 'B') ('C', 'B', 'A')
```

By default, `permutations` returns different orderings for the entire collection, but we can use the optional `r` parameter to limit the function to finding shorter permutations.

```
p_2 = permutations("ABC", r=2)
# ('A', 'B') ('A', 'C') ('B', 'A') ('B', 'C') ('C', 'A') ('C', 'B')
```

Providing an `r` value greater than the length of the collection passed into `permutations` will yield an empty permutations object.

Now let's take a look at `combinations`. `combinations` returns an iterable object containing unique combinations of elements from a provided collection. Note that `combinations` isn't concerned with the order of elements, so `combinations` will treat `('A', 'B')` as being identical to `('B', 'A')` in its results.

The length of the resulting combinations is controlled by the `r` parameter once again, but in the case of `combinations`, this argument is mandatory.

```
from itertools import combinations

c_1 = combinations("ABC", r=2)
# ('A', 'B') ('A', 'C') ('B', 'C')

c_2 = combinations("ABC", r=3)
# ('A', 'B', 'C')
```

It is possible to get duplicate elements back from `combinations`, but

only if the provided iterable contains multiple instances of a given element. `(1, 2, 3, 1)`, for example.

```
c_3 = combinations((1, 2, 3, 1), r=2)
# (1, 2) (1, 3) (1, 1) (2, 3) (2, 1) (3, 1)
```

In this case `(1, 2)` and `(2, 1)` are not simply the same elements in a different order, the 1s are in fact different elements in the original collection.

It's possible to include instances where an item is paired with itself using the `combinations_with_replacement` function. It works just like `combinations`, but will also match every element to itself.

```
from itertools import combinations, combinations_with_replacement

c_4 = combinations((1, 2, 3), r=2)
# (1, 2) (1, 3) (2, 3)

c_5 = combinations_with_replacement((1, 2, 3), r=2)
# (1, 1) (1, 2) (1, 3) (2, 2) (2, 3) (3, 3)
```

That wraps up the combinatoric iterators! I hope you learnt something new, and be sure to check out the official documentation for more details.

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money back guarantee.

We'll be back next Monday with another snippet post, this time covering a very interesting type of collection. Follow us on Twitter, or sign up to our mailing list below so you don't miss out!

Phil Best
I'm a freelance developer, mostly working in web development. I also create course content for Teclado!

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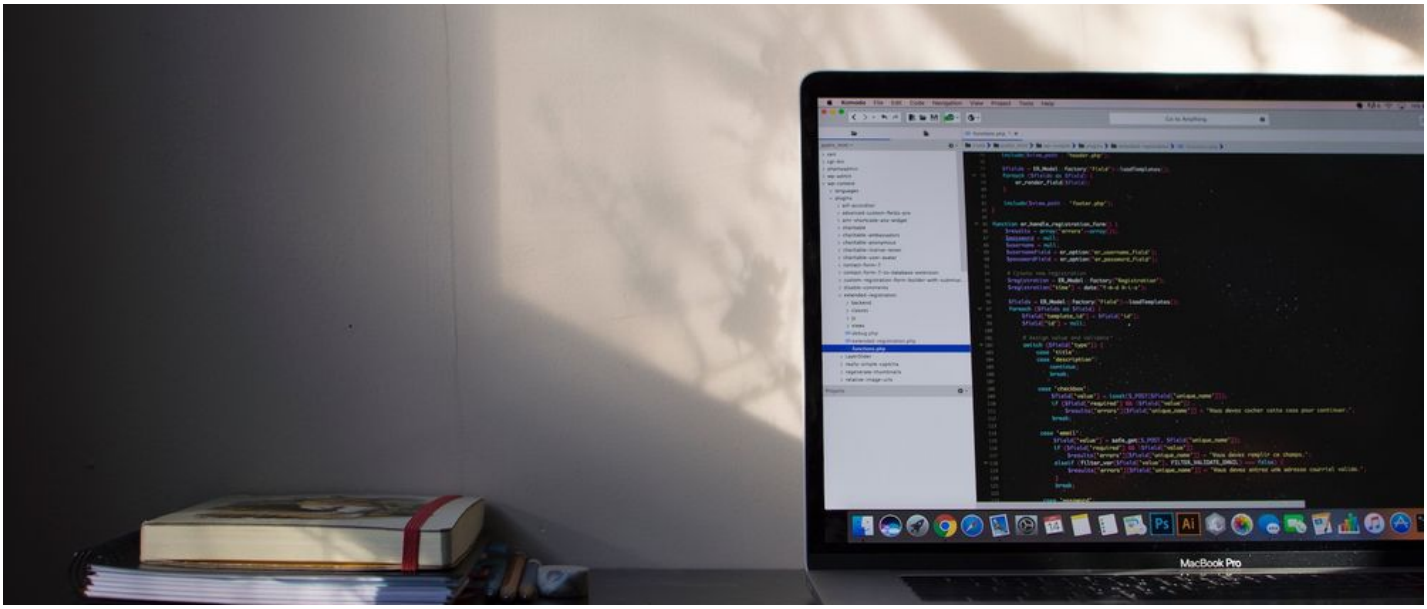

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Jose Salvatierra
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