



NumPy concatenate()

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Summary: in this tutorial, you'll learn how to use the NumPy `concatenate()` function to join elements of two or more arrays into a single array.

Introduction to the NumPy concatenate() function

The `concatenate()` function allows you to join two or more [arrays](https://www.pythontutorial.net/python-numpy/create-numpy-array/) into a single array. Here's the basic syntax of the `concatenate()` function:

```
np.concatenate((a1,a2,...),axis=0)
```

In this syntax, the `concatenate()` function joins the elements of the [sequence](https://www.pythontutorial.net/advanced-python/python-sequences/) of arrays (a1, a2, ...) into a single array. The arrays in the sequence must have the same shape.

The axis specifies the axis along which the function will join the arrays. If the `axis` is `None`, the function will flatten the arrays before joining.

The `concatenate()` function returns the concatenated array.

NumPy concatenate() function examples

Let's take some examples of using the `concatenate()` function.

1) Using the concatenate() function to join two 1D arrays

The following example uses the `concatenate()` function to join elements of two 1D arrays:

```
import numpy as np

a = np.array([1, 2])
b = np.array([3, 4])

c = np.concatenate((a, b))
print(c)
```

`concatenate()`



Output:

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

In this example, the `concatenate()` function joins the elements in the array a and b into a single array c.

2) Using the concatenate() function to join two 2D arrays

The following example uses the `concatenate()` function to join two 2D arrays:

```
import numpy as np

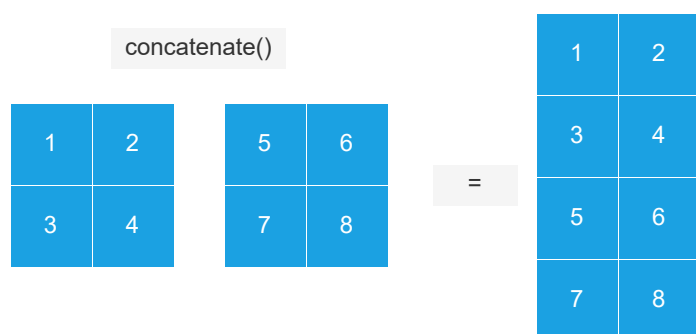
a = np.array([
    [1, 2],
    [3, 4]
])
```

```
b = np.array([
    [5, 6],
    [7, 8]
])

c = np.concatenate((a, b))
print(c)
```

Output:

```
[[1 2]
 [3 4]
 [5 6]
 [7 8]]
```



The output shows that the `concatenate()` function joins two arrays vertically because by default the axis argument is zero.

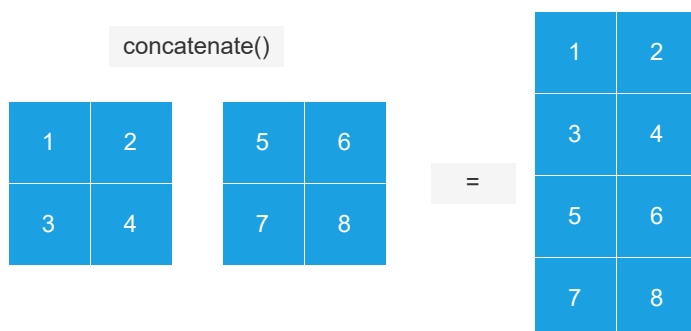
If the axis is one, the `concatenate()` function will join two arrays horizontally. For example:

```
import numpy as np

a = np.array([
    [1, 2],
    [3, 4]
])
b = np.array([
    [5, 6],
    [7, 8]
])
```

```
])
```

```
c = np.concatenate((a, b), axis=1)  
print(c)
```



Output:

```
[[1 2 5 6]  
 [3 4 7 8]]
```

Summary

- Use the numpy `concatenate()` function to join elements of a sequence of arrays into a single array.