NumPy split()

Summary: in this tutorial, you'll learn how to use the NumPy `split()` function to split an array into multiple sub-arrays.

Introduction to the NumPy split() function

The `split()` funciton splits an array (https://www.pythontutorial.net/python-numpy/create-numpy-array/) into multiple sub-arrays as views. The syntax of the `split()` function is as follows:

```
numpy.split(ary, indices_or_sections, axis=0)
```

In this syntax:

`ary` is the array to be split into subarrays.

`indices_or_sections` can be an integer or a 1-D array of sorted integers.

If it is an integer, the function splits the input array into N equal arrays along the axis. If the split is not possible, the function will raise an error.

If indices_or_sections is a 1D array of sorted integers, the indices indicate where along the axis the function splits the array.

When an index exceeds the dimension of the array along the axis, the function returns an empty subarray.

The following picture shows how the `split()` function splits the array with indices 2, 3, and 4. It results in 4 arrays.
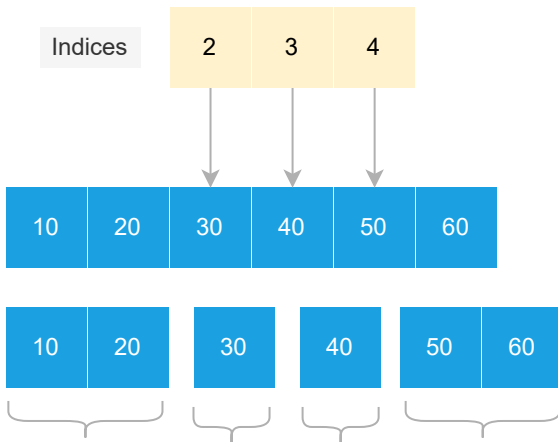
NumPy split() function example

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

1) Using the split() function to split a 1D array

The following example uses the `split()` function to split a 1D array with seven elements into three sub-arrays:

```python
import numpy as np


a = np.arange(1,7)
results = np.split(a,3)

print(a)
print(results)
```

Output:

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

```
[array([1, 2]), array([3, 4]), array([5, 6])]
```

The following example raises an error because the split is not possible:

```python
import numpy as np


a = np.arange(1,7)
results = np.split(a,4)
```

Output:

```
ValueError: array split does not result in an equal division
```

In this example, the array has 6 elements therefore it cannot be split into 4 arrays of equal size. If you want to have a more flexible split, you can use the `array_split()` function.

2) Using the split() function to split a 2D array

The following example uses the `split()` function to split a 2D array into two subarrays:

```python
import numpy as np

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

print(a)
print(results)
```

Output:

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

```
[array([[1, 2],
        [3, 4]]), array([[5, 6],
        [7, 8]])]
```

3) Using the NumPy split() function using indices

The following example uses the `split()` function to split a 1D array using an array of indices:

```python
import numpy as np


a = np.arange(10,70,10)
results = np.split(a, [2, 3, 4])
print(a)
print(results)
```

Output:

```
[1 2 3 4 5 6]
[array([1, 2]), array([3]), array([4, 5, 6])]
```

Summary

- Use NumPy `split()` function to split an array into subarrays.