NumPy Filter Array

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Filtering Arrays

Getting some elements out of an existing array and creating a new array out of them is called *filtering*.

In NumPy, you filter an array using a *boolean index list*.

A *boolean index list* is a list of booleans corresponding to indexes in the array.

If the value at an index is `True` that element is contained in the filtered array, if the value at that index is `False` that element is excluded from the filtered array.

Example

Create an array from the elements on index 0 and 2:

```
import numpy as np

arr = np.array([41, 42, 43, 44])

x = [True, False, True, False]

newarr = arr[x]

print(newarr)
```

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The example above will return `[41, 43]`, why?

Because the new filter contains only the values where the filter array had the value `True`, in this case, index 0 and 2.

Creating the Filter Array

In the example above we hard-coded the `True` and `False` values, but the common use is to create a filter array based on conditions.

Example

Create a filter array that will return only values higher than 42:

```
import numpy as np

arr = np.array([41, 42, 43, 44])

# Create an empty list
filter_arr = []

# go through each element in arr
for element in arr:
  # if the element is higher than 42, set the value to True, otherwise
False:
  if element > 42:
    filter_arr.append(True)
  else:
    filter_arr.append(False)

newarr = arr[filter_arr]

print(filter_arr)
print(newarr)
```

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Example

Create a filter array that will return only even elements from the original array:

```
import numpy as np

arr = np.array([1, 2, 3, 4, 5, 6, 7])

# Create an empty list
filter_arr = []

# go through each element in arr
for element in arr:
  # if the element is completely divisble by 2, set the value to True,
otherwise False
  if element % 2 == 0:
    filter_arr.append(True)
  else:
    filter_arr.append(False)

newarr = arr[filter_arr]

print(filter_arr)
print(newarr)
```

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Creating Filter Directly From Array

The above example is quite a common task in NumPy and NumPy provides a nice way to tackle it.

We can directly substitute the array instead of the iterable variable in our condition and it will work just as we expect it to.

Example

Create a filter array that will return only values higher than 42:

```
import numpy as np
```

```
arr = np.array([41, 42, 43, 44])

filter_arr = arr > 42

newarr = arr[filter_arr]

print(filter_arr)
print(newarr)
```

Try it Yourself »

Example

Create a filter array that will return only even elements from the original array:

```
import numpy as np

arr = np.array([1, 2, 3, 4, 5, 6, 7])

filter_arr = arr % 2 == 0

newarr = arr[filter_arr]

print(filter_arr)
print(newarr)
```

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