e-8

March 11, 2025

[5]:
```
import numpy as np
from PIL import Image
from IPython.display import display
```

[6]:
```
"""
universal functions :
sometime we should usd from some methods and functions like add for arrays
but python implemeting this with python language is not good and running time␣
 ↪is very slow
to this reason, numpy used from universal finctions(ufunc) and run this␣
 ↪functions
with C language beacuse it is not slow and it is very fast
"""
```

[6]:
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finctions(ufunc) and run this functions\nwith C language beacuse it is not slow
and it is very fast\n'
```

[20]:
```
a = np.array([
    [1, 2, 3],
    [4, 5, 6],
    [7, 8, 9]
])

b = np.array([
    [1, 2, 3],
    [4, 5, 6],
    [7, 8, 9]
])

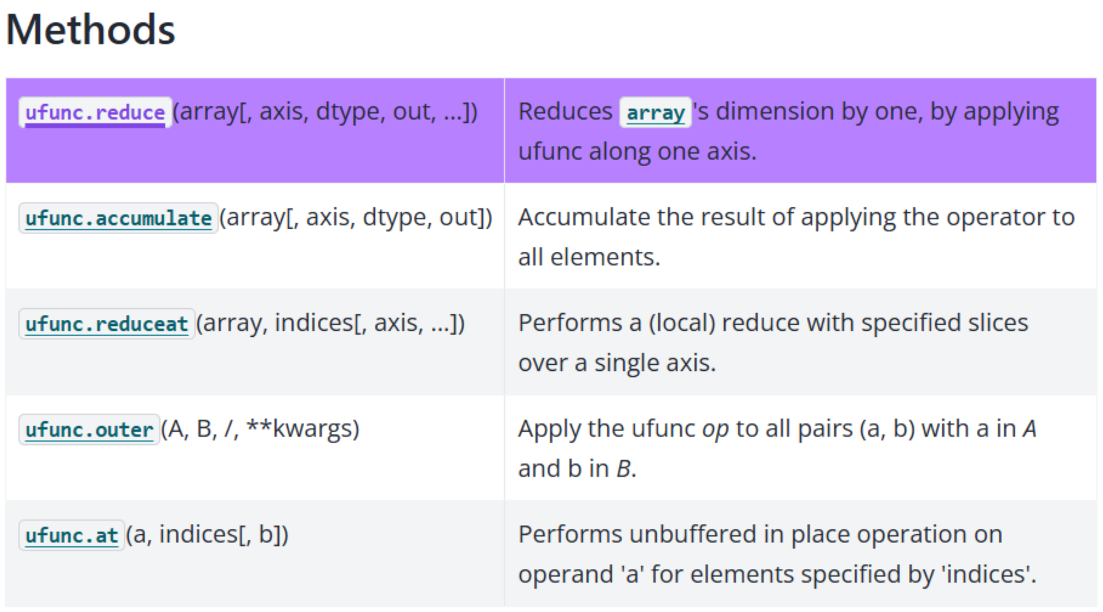
np.add(a, b)
```

[20]:
```
array([[ 2,  4,  6],
       [ 8, 10, 12],
       [14, 16, 18]])
```

```
[21]: np.sum(a)
```

```
[21]: np.int64(45)
```

```
[22]: display(Image.open('ufunc_methods.png'))
```



Methods

`ufunc.reduce`(array[, axis, dtype, out, ...])	Reduces `array`'s dimension by one, by applying ufunc along one axis.
`ufunc.accumulate`(array[, axis, dtype, out])	Accumulate the result of applying the operator to all elements.
`ufunc.reduceat`(array, indices[, axis, ...])	Performs a (local) reduce with specified slices over a single axis.
`ufunc.outer`(A, B, /, **kwargs)	Apply the ufunc *op* to all pairs (a, b) with a in *A* and b in *B*.
`ufunc.at`(a, indices[, b])	Performs unbuffered in place operation on operand 'a' for elements specified by 'indices'.

```
[23]: # ufunc methods shoud used on ufuncs

      np.add.reduce(a)
```

```
[23]: array([12, 15, 18])
```

```
[24]: np.add.accumulate(a)
```

```
[24]: array([[ 1,  2,  3],
             [ 5,  7,  9],
             [12, 15, 18]])
```

```
[26]: c = np.array([
          [1, 2, 3],
      ])

      d = np.array([
          [4, 5, 6],
      ])

      np.add.outer(c, d)
```

```
[26]: array([[[[5, 6, 7]],

               [[6, 7, 8]],

               [[7, 8, 9]]]])
```