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NumPy ufuncs

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What are ufuncs?

ufuncs stands for "Universal Functions" and they are NumPy functions that operates on the `ndarray` object.

Why use ufuncs?

ufuncs are used to implement *vectorization* in NumPy which is way faster than iterating over elements.

They also provide broadcasting and additional methods like `reduce`, `accumulate` etc. that are very helpful for computation.

ufuncs also take additional arguments, like:

`where` boolean array or condition defining where the operations should take place.

`dtype` defining the return type of elements.

`out` output array where the return value should be copied.

What is Vectorization?

Converting iterative statements into a vector based operation is called vectorization.

It is faster as modern CPUs are optimized for such operations.

Add the Elements of Two Lists

list 1: [1, 2, 3, 4]

list 2: [4, 5, 6, 7]

One way of doing it is to iterate over both of the lists and then sum each elements.

Example

Without ufunc, we can use Python's built-in `zip()` method:

```
x = [1, 2, 3, 4]
y = [4, 5, 6, 7]
z = []

for i, j in zip(x, y):
    z.append(i + j)
print(z)
```

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NumPy has a ufunc for this, called `add(x, y)` that will produce the same result.

Example

With ufunc, we can use the `add()` function:

```
import numpy as np

x = [1, 2, 3, 4]
y = [4, 5, 6, 7]
z = np.add(x, y)

print(z)
```

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