

CuPy: A NumPy-Compatible Library for NVIDIA GPU Calculations [Okuta et al.]



```
import numpy as np
x = np.random.rand(10)
W = np.random.rand(10, 5)
y = np.dot(x, W)
```

to
GPU


to
CPU



```
import cupy as cp
x = cp.random.rand(10)
W = cp.random.rand(10, 5)
y = cp.dot(x, W)
```

1. Highly-compatible with NumPy
 - data types, indexing, broadcasting, operations
 - Users can write CPU/GPU-agnostic code
2. High performance on NVIDIA GPUs
 - cuBLAS, cuDNN, cuRAND, cuSPARSE, and NCCL
3. Easy to install
 - `$ pip install cupy`
4. Easy to write custom kernel
 - ElementwiseKernel, ReductionKernel

Other capabilities of CuPy

- Memory pool, kernel fusion, GPU memory profiler
- CuPy is the GPU backend of  Chainer