Theano Tutorial

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Installation

Python

Numpy

Scipy

Theano

h5py

Matplotlib

Ipython notebook (Jupyter Notebook)

… NVIDIA driver, CUDA, cuDNN

pip
Windows: Anaconda, Winpython ...
Linux: apt-get/dnf/yum

Python

Shallow Copy vs Deep Copy

a = b #shallow copy, if b is a high level data type, list, dict, func, object…

a = copy.deepcopy(b)

Slice

a[2:5], a[2:], a[:5], a[-1] == a[len(a)-1]

Numpy

Broadcast

Add a new broadcastable axis

a=a[:,None] a=a[:,np.newaxis]

the broadcastable axis will adapt the shape when Calculating

Theano

TensorVariable

Variable

SharedVariable

Changeable Constant

Expression

Code Structure

Inputs	x, y
Parameters	θ
Expressions	$\hat{y} = f(x, \theta)$
Loss	$L = g(\hat{y}, y)$ # y represents ground-truth
Gradient	grads = theano.grad(L, θ)
Updates	SGD, rmsProp, Adam ....
Function	f = theano.function([x,y], [L, ŷ], updates=updates)
Execute	loss, output = f(real_data)

Advantages and Disadvantages

Advantages: flexible
white box

Disadvantages: efficiency
coding tricks (concatenate, indexing)

Q&A