Introduction to Deep Neural Networks

GPU computing perspective
Getting Started

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Outline

Introduction

Prerequisites

* ⋆ Basic training in Calculus
* ⋆ Basic training in Linear Algebra
  * Matrix operations
  * Matrix properties: transform, rank, norm, determinant, etc
  * Eigendecomposition, Singular Value Decomposition.
* ⋆ Basic programming skills
  * If-else conditioning
  * Loops
  * Function, class, library
  * Source code control: Git (optional)

Software and Tools

- ⋆ Ubuntu 14.04
- ⋆ CUDA Toolkit 6.5
- ⋆ Python 2.7.9 (Why not 3.*?)
- ⋆ Theano
- ⋆ numpy, scipy, etc
- ⋆ Eclipse+PyDev

Ubuntu 14.04 Installation

Nvidia Graphics Driver

CUDA Toolkit

Anaconda

Anaconda: post installation

Eclipse and PyDev

Scalar, Vector, Matrix and Tensor

Matrix Operations

Matrix Properties

Singular Value Decomposition (SVD)

Optimization Problem: Hypothesis

Optimization Problem: Cost function

Dataset: How to split the data?

Dataset: Cross validation

MNIST

CIFAR-10

Mean subtraction

Unit variance

PCA

ZCA Whitening

SGD

Jacobian

Hessian

Summary