DeepRob

Discussion 2
PyTorch
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What is Machine Learning Framework?

- Set of libraries and tools to provides a structured and standardized way to build, train, and deploy machine learning models
- Pytorch is a machine learning framework

Components of ML Framework

- Pre-processing - prepare data by normalizing, transforming, scaling or encoding
- Algorithms - built in algorithms such as CNN, SVM
- Automatic Differentiation
- Optimization Algorithms - SGD, Adam, RMSprop
- Evaluation Metrics - accuracy, precision, recall, F1 score
- GPU acceleration

Some Popular Frameworks

Pytorch

- Based on the former Torch library, PyTorch was officially launched in 2016 by a team from Facebook's research lab
- Key Feature:
  - Open source
  - Autograd
  - Neural Net modules
  - Expanded environment: torchvision and torchaudio

Example: MNIST

- MNIST is a image data set with grayscale images of handwritten number for 0-9
- Images are 28x28 pixels

Pytorch Data

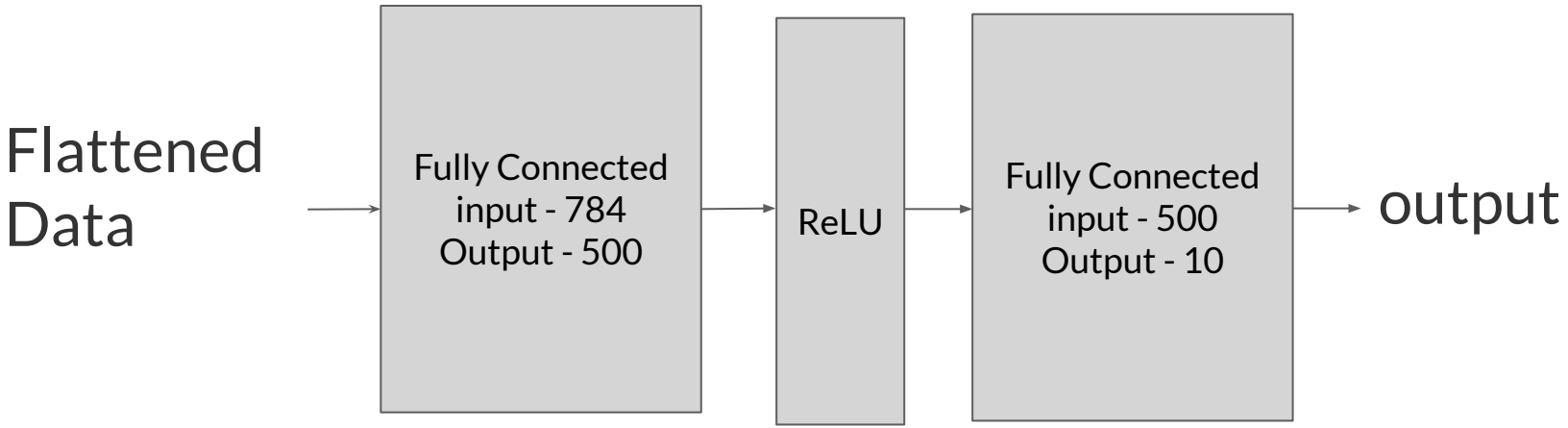
Pytorch has a lot of datasets available:
https://pytorch.org/vision/0.16/datasets.html

To access it use:

- torchvision.datasets

These are already compatible with dataload

Simple Neural Network



Cross Entropy Loss

- What is Cross Entropy Loss?

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$$\ell(x, y) = L = \{l_1, \dots, l_N\}^\top, \quad l_n = -w_{y_n} \log \frac{\exp(x_{n,y_n})}{\sum_{c=1}^{C} \exp(x_{n,c})} \cdot 1\{y_n \neq \text{ignore\_index}\}$$

Optimizers

- We will use Adam
- Adam is a common choice for optimizer
- To learn about optimizers next lecture

Live Example

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