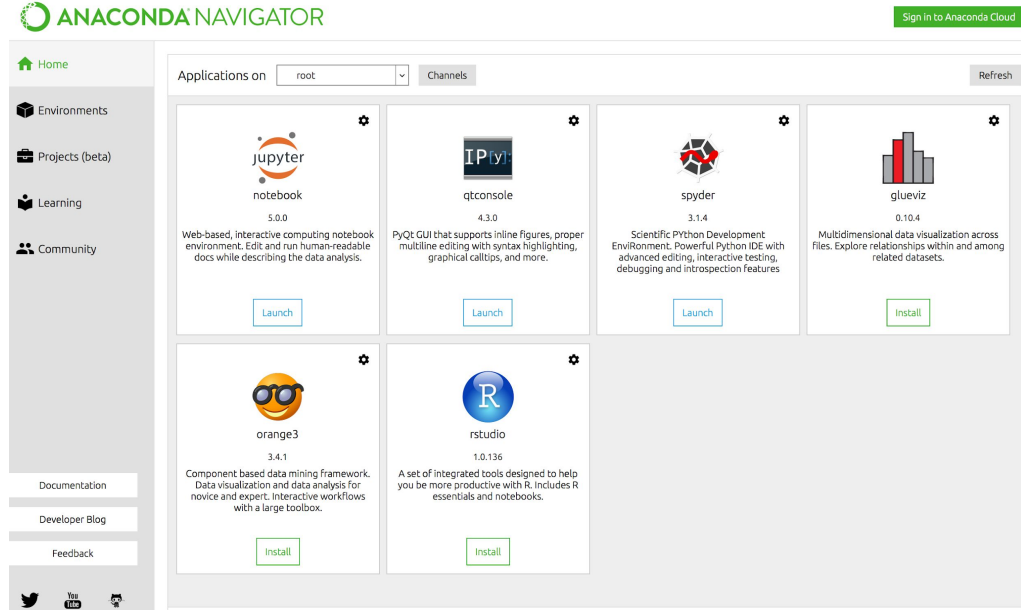# PyTorch Tutorial

Beibin Li

Python 3 and Anaconda

- Python: Created at 1991
- Python 1.0: released at 1994
- Lambda, Map, Reduce, etc
- Exception Handling
- Python 2.0: at 2000
- Garbage collection
- Unicode Support
- Python 3.0: at 2008
- Performance & Design Improvements
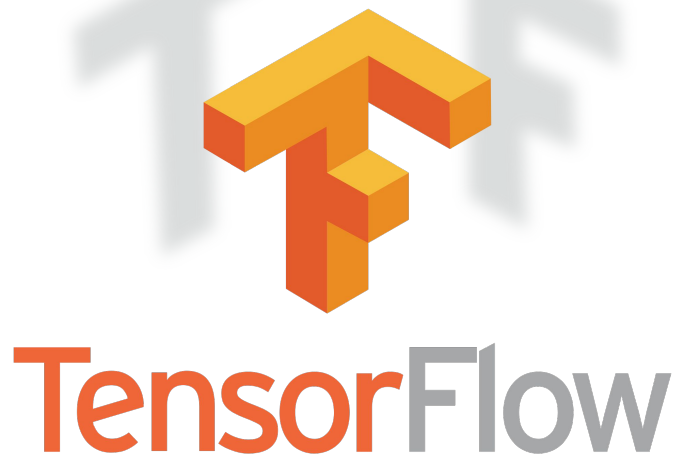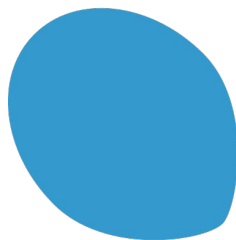- Syntax is different, and not backwards compatible

- (optional if you are already familiar with Python)
- Package management
- Environment control
- Nice IDE (Spyder) and debugger
- Jupyter Notebook
- and more…

Deep Learning Libraries

PyTorch

- Dynamic Graph
- Easy and Flexible
- Popular
- Well maintained
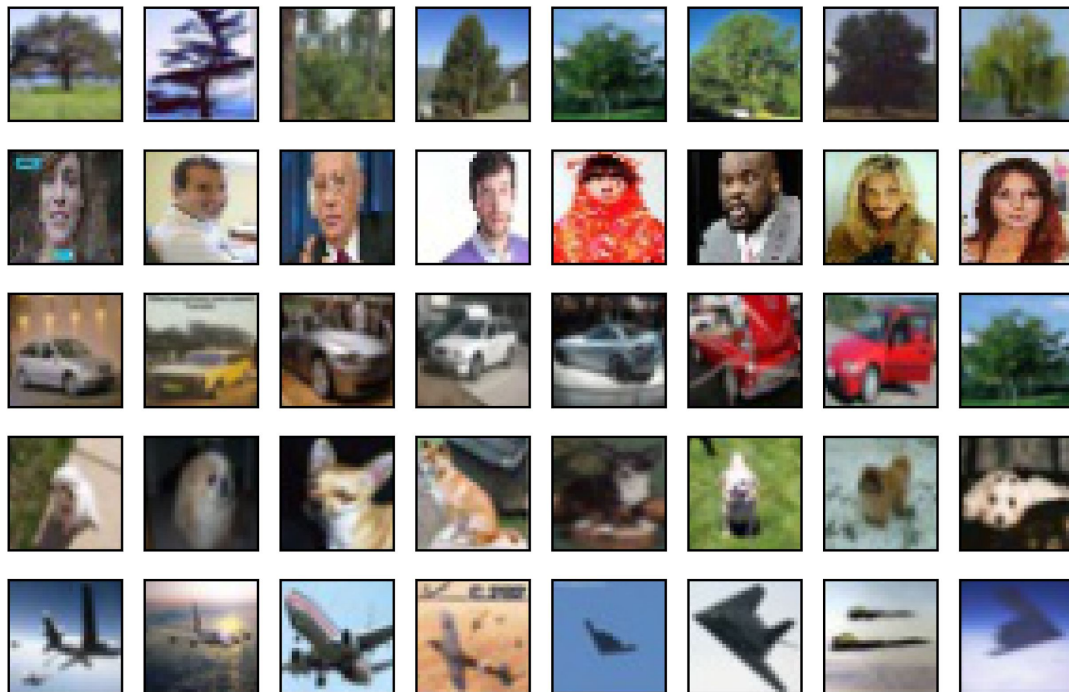- Compatible with Torch and Caffe
- more...

Which Object?

Image Classification:

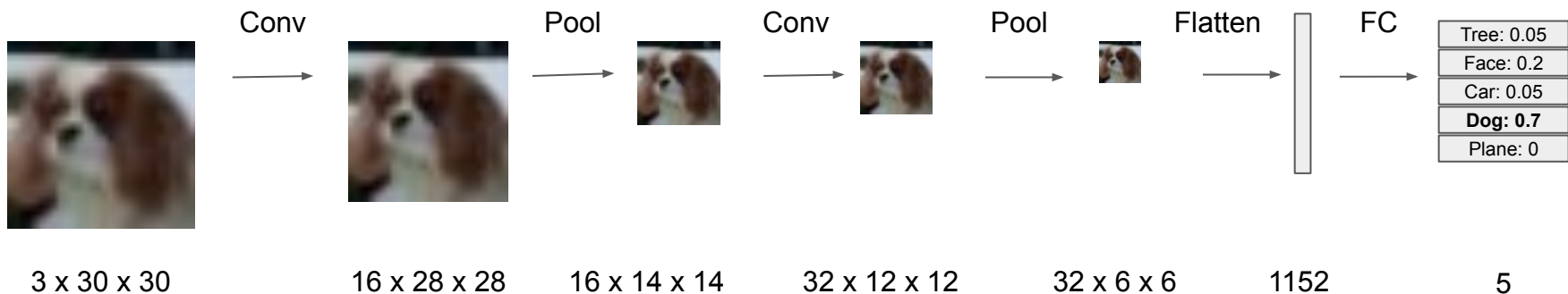- Tree
- Face
- Car
- Dog
- Plane

Training set: 90 images per cls
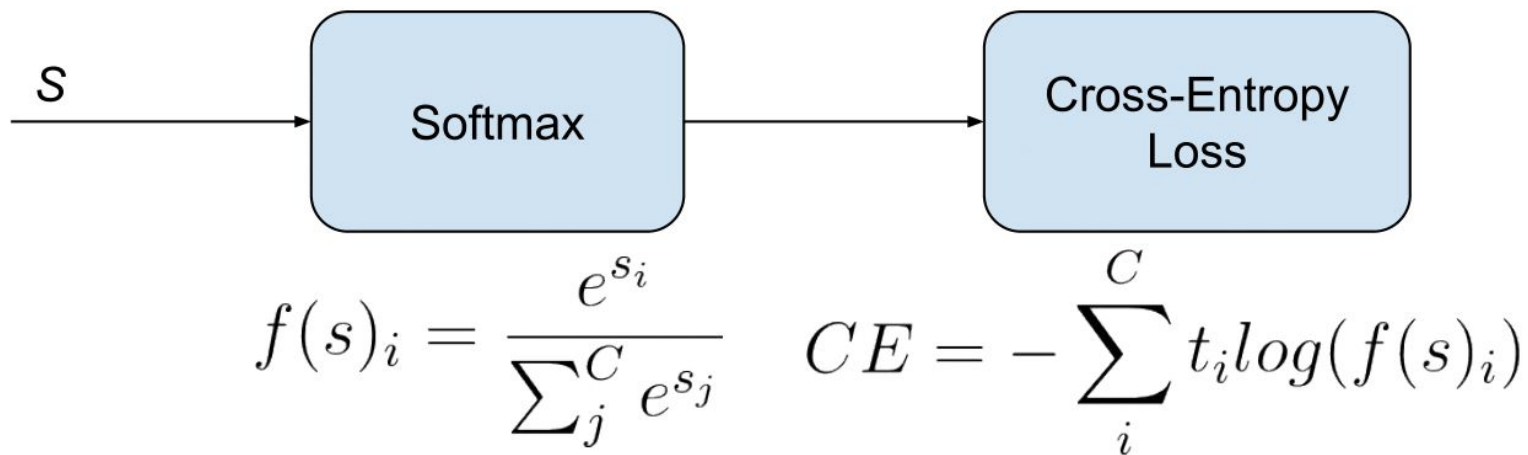Testing set: 10 images per cls

Suppose we use
- convolution with kernel size = 3, stride = 1
- Pooling with kernel size = 2, stride = 2

	Conv		Pool		Conv		Pool		Flatten		FC	

Tree: 0.05
Face: 0.2
Car: 0.05
Dog: 0.7
Plane: 0

3 x 30 x 30   16 x 28 x 28   16 x 14 x 14   32 x 12 x 12   32 x 6 x 6   1152   5

Cross Entropy Loss

$$f(s)_i = \frac{e^{s_i}}{\sum_j^C e^{s_j}} \qquad CE = -\sum_i^C t_i log(f(s)_i)$$

Loss and Backpropagation