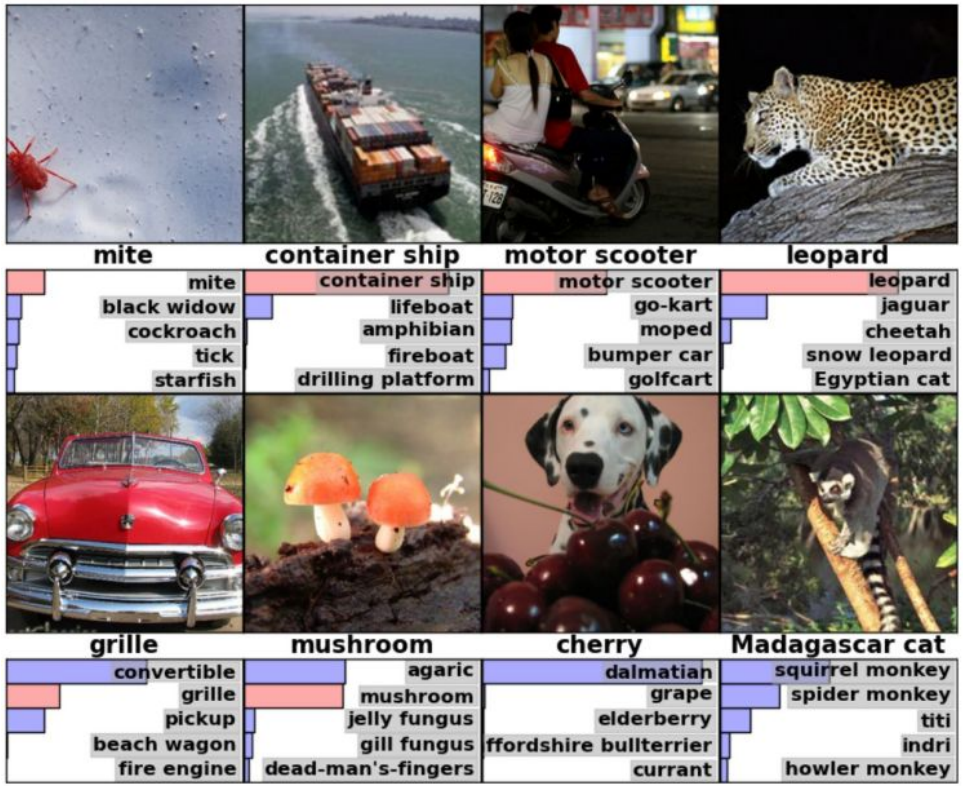
Convolution Neural Networks for Image classification

Gary Baugh

ImageNet visual recognition challenge

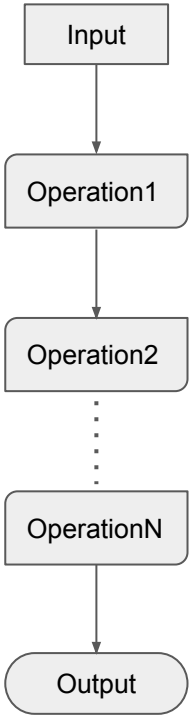


- 1000 image classes.
- 1.2M training images with labels.
- 100k images for testing.

Popular classifier network designs:

- AlexNet (2012)
- GoogleNet (2014)
- ResNet (2015)
- VGGNet (2014)

General architecture of CNN classifier



Category 281: ‘tabby, tabby cat’

Directed computational graph. The common operation blocks (layers) are:

- Convolution
- Pooling
- Inner product or fully connected
- Rectified linear unit (ReLU)

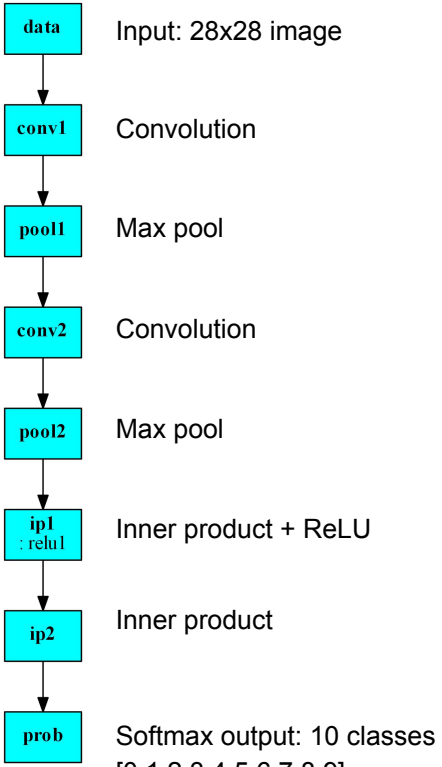
The parameters for the operations are learnt in a training phase. Popular tools for training and design validation are:

- Caffe (Berkeley AI Research)
- Tensorflow (Google)
- PyTorch (Facebook)

https://dgschwend.github.io/netscope/quickstart.html

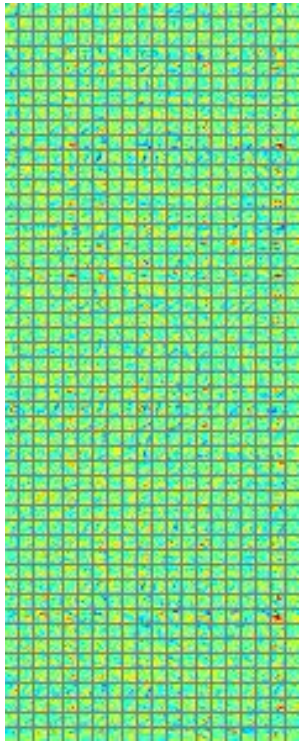
Caffe LeNet: handwritten digit classifier

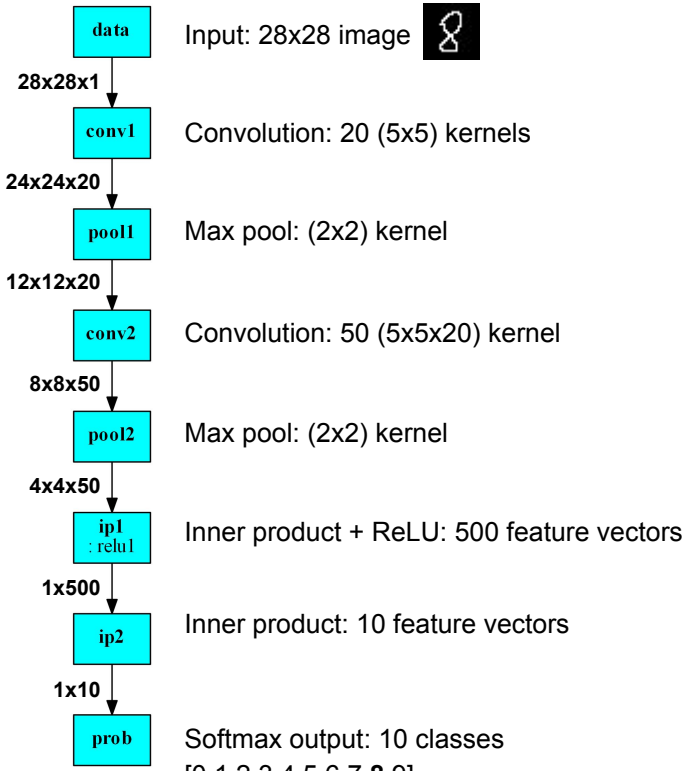
Train with MNIST dataset



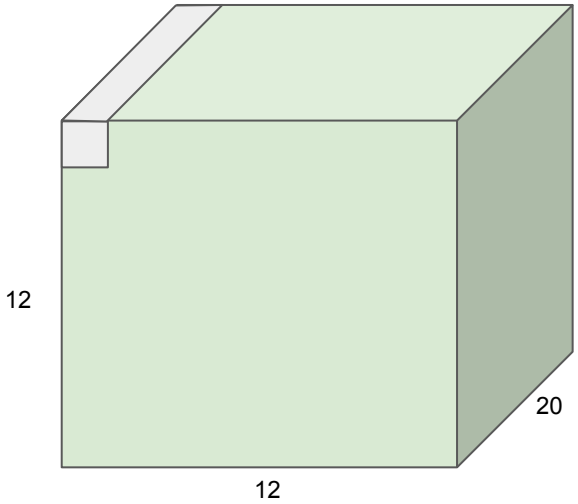
Caffe LeNet: inference

conv2 kernels: 50 (5x5x20)

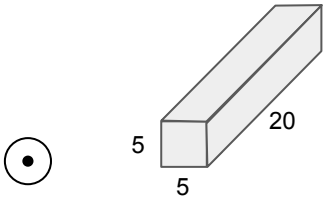




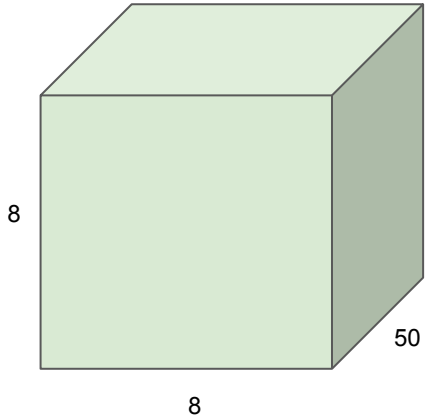
Convolution in 3D: conv2



Input: (12x12x20)



Kernels: 50x (5x5x20)



Output: (8x8x50)