Introduction to deep learning

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github repository

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https://github.com/chyld/intro-deep-learning

Overview

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1. Machine Learning
2. Supervised vs Unsupervised
3. Why is deep learning popular?
4. Theory of deep learning
5. Types of neural networks
6. Keras and Tensorflow
7. Code: MNIST on Dense Network
8. Theory of CNNs
9. Code: Fashion MNIST on CNN
10. Deep learning on Tesla GPUs on AWS
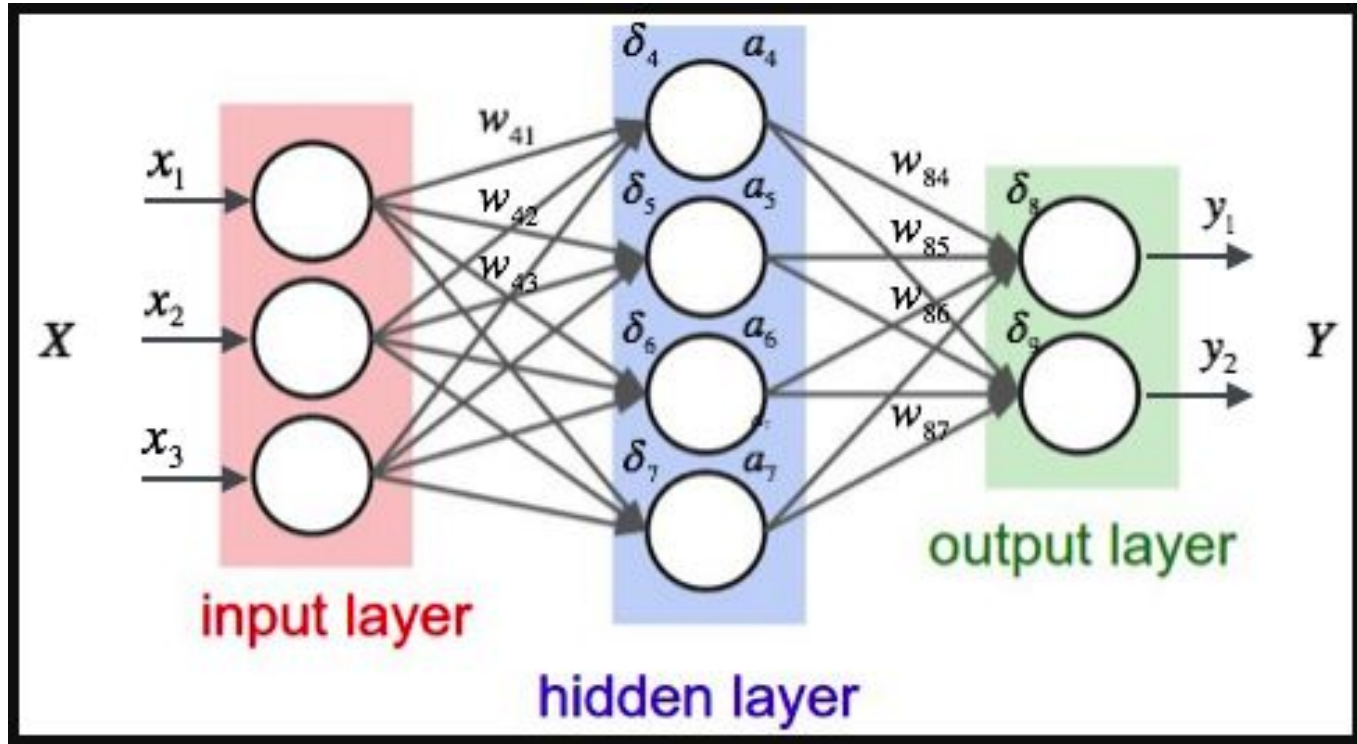11. Bonus: Transfer Learning

Machine Learning

Supervised vs Unsupervised

Why is deep learning so popular?

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- Lots of data
- Fast processors
- Cloud computing
- Better models

Theory of deep learning

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Theory of deep learning - 1

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- Perceptrons (neuron)
- Input/Output layers
- Hidden layers
- Linear Equation w1x1 + w2x2 + w3x3 + bias
- Activations (nonlinear)
  - Sigmoid, Tanh, Relu
- Feed forward
- Loss functions
- Optimizers / Backpropagation (partial derivatives)

Theory of deep learning - 2

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- Update weights, biases
- Stochastic, Mini-batch, Batch update
- Epochs
- Output: Linear, Sigmoid, Softmax
- Train, validation, test
- Bias vs variance

Types of neural networks

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- Dense / Fully Connected / Multilayer Perceptron
- Convolutional Neural Networks (CNN)
- Recurrent Neural Networks (RNN)
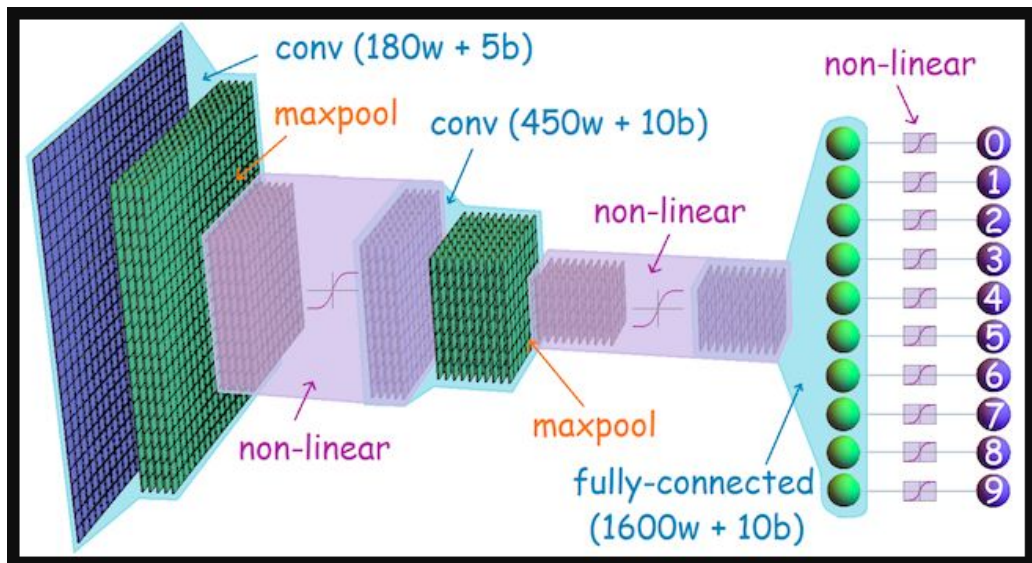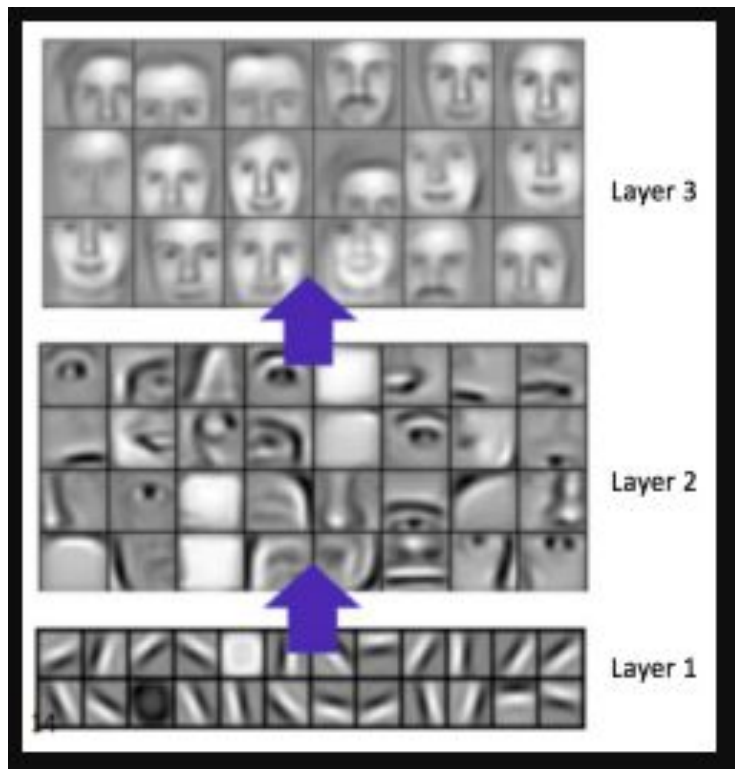- Generative adversarial network (GAN)
- more...

Keras and Tensorflow
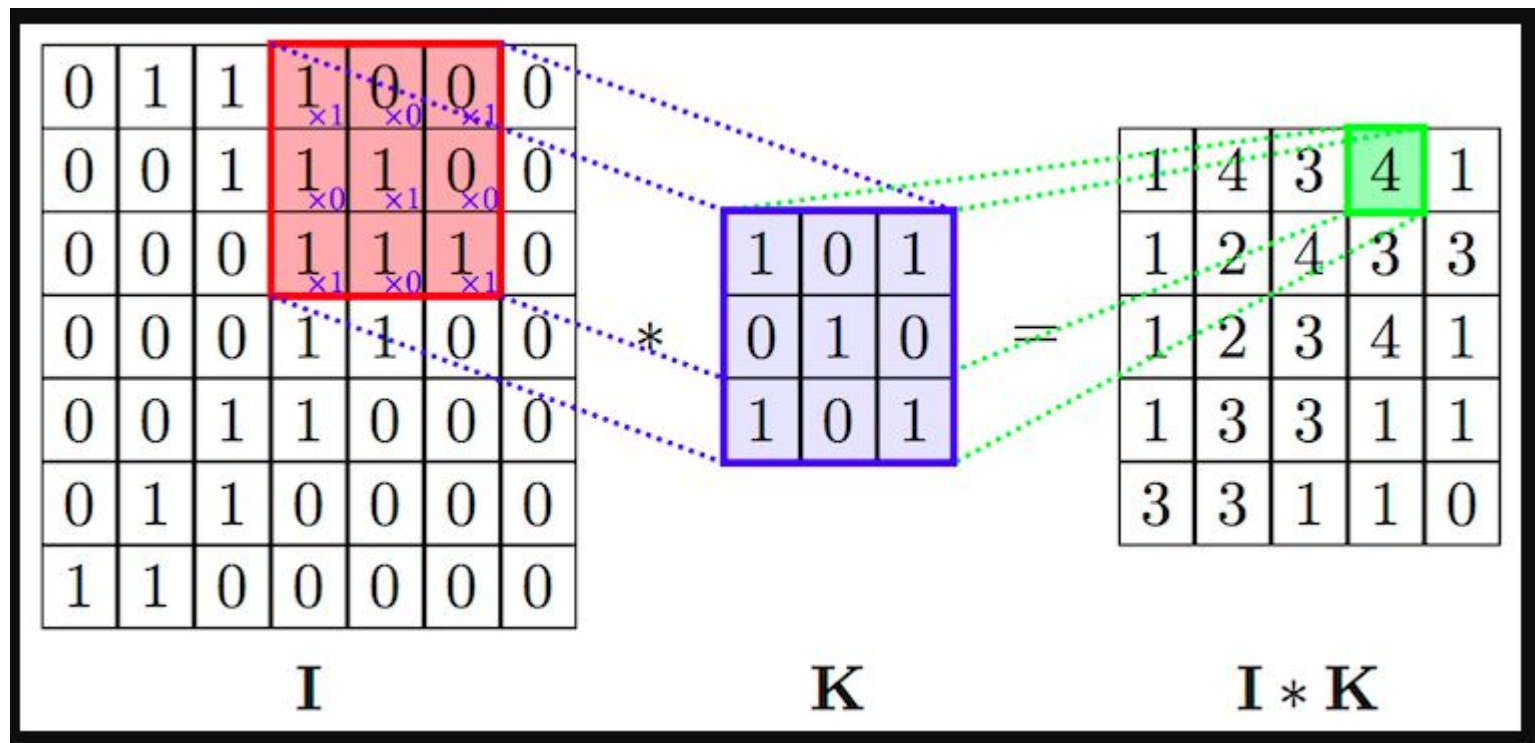
Code: MNIST on Dense Network

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- https://keras.io/datasets/
- https://github.com/chyld/intro-deep-learning/blob/master/01-fully-connected.ipynb

Theory of CNNs

Theory of CNNs

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Code: Fashion MNIST on CNN

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https://github.com/chyld/intro-deep-learning/blob/master/02-fashion-cnn-.ipynb

Deep learning on Tesla GPUs on AWS

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Deep Learning AMI (Ubuntu) Version 10.0 - ami-e580c79d

Comes with latest binaries of deep learning frameworks pre-installed in separate virtual environments: MXNet, TensorFlow, Caffe, Caffe2, PyTorch, Keras, Chainer, Theano and CNTK. Fully-configured with NVidia CUDA, cuDNN and NCCL as well as Intel MKL-DNN

Free tier eligible

Root device type: ebs   Virtualization type: hvm   ENA Enabled: Yes

Select

64-bit

GPU compute	p2.xlarge	4	61
GPU compute	p2.8xlarge	32	488
GPU compute	p2.16xlarge	64	732
GPU compute	p3.2xlarge	8	61
GPU compute	p3.8xlarge	32	244
GPU compute	p3.16xlarge	64	488

Bonus: Transfer Learning