Deep Learning

Main Topic	*Sub Topic*
Introduction	Feedforward Neural networks. Gradient descent and the backpropagation algorithm. Unit saturation, aka the vanishing gradient problem, and ways to mitigate it. RelU Heuristics for avoiding bad local minima. Heuristics for faster training. Nestors accelerated gradient descent. Regularization. Dropout.
Convolutional Neural Networks	Architectures, convolution / pooling layers
Recurrent Neural Networks	LSTM, GRU, Encoder Decoder architectures
Deep Unsupervised Learning	Autoencoders (standard, sparse, denoising, contractive, etc), Variational Autoencoders, Adversarial Generative Networks, Autoencoder and DBM
Applications of Deep Learning to Computer Vision	Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, video to text with LSTM models. Attention models for computer vision tasks.
Applications of Deep Learning to NLP	Introduction to NLP and Vector Space Model of Semantics. Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Glove, Evaluations and Applications in word similarity, analogy reasoning. Named Entity Recognition, Opinion Mining using Recurrent Neural Networks. Parsing and Sentiment Analysis using Recursive Neural Networks. Sentence Classification using Convolutional Neural Networks. Dialogue Generation with LSTMs . Applications of Dynamic Memory Networks in NLP. Recent Research in NLP using Deep Learning: Factoid Question Answering, similar question detection, Dialogue topic tracking, Neural Summarization, Smart Reply.