19ECS773: DEEP LEARNING

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Unit I **8L**

Introduction: Feed forward neural networks. Gradient descent and the back propagation 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.

Unit II **9L**

Convolution Neural Network: Architectures, convolution / pooling layers.

Unit III **9L**

Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures.

Unit IV **8L**

Deep Unsupervised Learning: Auto encoders (standard, sparse, denoising, contractive, etc), Variational Auto encoders, Adversarial Generative Networks, Auto encoder and DBM.

Unit V **8L**

Applications of Deep Learning to Computer Vision

Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, and video to text with LSTM models. Attention models for computer vision tasks.

Textbook(s):

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016

References:

1. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.
2. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017