**Deep Learning and its applications: (Basic to Advance)[B2A]**

1. Introduction: Basic classification and regression, Machine learning vs Deep Learning, basics of neural networks, single and multi-layer perceptron algorithm. Few other models such as SVM, HMM, GMM, Bayes etc.
2. Fully connected networks: Single and multi-layer networks, loss functions, intuition, backpropagation, computational graphs, optimizers, network initialization, Activation functions, Batch normalization.
3. Convolutional neural networks: CNN intuition, CNN specifications and parameterizations, Max pooling, upsampling, case studies- AlexNet, VGG, Inception, ResNet, DenseNet etc. Deconvolutions,
4. Object Detection: Basics, Overfeat, Sliding window, RCNN, FRCNN, Faster-RCNN, SSD, YOLO cover the main architectural backbones and its variation from that journal paper.
5. Autoencoder and VAE: Basic intuition and motivation of AE, AE applications, image generation using VAE, theoretical background of VAE, VAE practically, its pros and cons.
6. Generative Adversarial Networks (GAN): Theoretical background of GAN, GAN practically, DC GAN, C-GAN, STACK-GAN, Pix2Pix, CycleGAN. More generation papers along with style transfer papers.
7. Recurrent Neural Networks (RNN): Problem with CNN and requirement of memory, intuition behind recurrent units, backpropagation in time, vanishing gradients, Long term and short term memory (LSTM) and Gated recurrent units (GRU).
8. Graph Convolutional Neural Network:
9. Natural Language Processing: Word embeddings word2vec and glove, transformer networks bert models,
10. Capsule Network: limitation of cnn and motivation behind CapsNet,