Deep Learning Specialization Courses Summary

There are total five courses in the deep learning specialization provided by deeplearning.ai on Coursera. First course introduces the foundations of deep learning; second course teaches about drivers of model performance; third course covers the experience on machine learning projects in industries; the fourth course teaches how to build convolutional neural networks and the fifth course teaches how to build models for natural language, audio and other sequence data.

The topics of each week are listed along with the academic papers which are the foundations of many deep learning concepts.

Use the link below to get 50% off the subscription of the specialization for the first month:
http://fbuy.me/v/keithlimingfeng

I. Neural Networks and Deep Learning -- Basic Introduction

Week 1. Basic Introduction

Week 2. Binary Classification, Logistic Regression, Gradient Descent, Vectorization, Broadcasting

Week3 - 4. Neural Network

II. Improving Deep Neural Network: Hyperparameter tuning, Regularization and Optimization

Week 1. Bias and Variance, Regularization, Dropout, Normalization, Vanishing gradients

Week2. Mini-batch Gradient descent, exponentially weighted averages, momentum, RMSprop, Adam, Learning Rate Decay

Week3. Hyperparameter Tuning, batch normalization, softmax

III. Structuring Machine Learning Projects

Week 1. Orthogonalization, Train/dev/test distributions, human-level performance, avoidable bias

Week 2. Error Analysis, mismatched data distributions, transfer learning

IV. Convolutional Neural Networks

Week 1. Edge Detection, Padding, pooling layers

Week 2. Classic Netoworks, Transfer Learning, data Augmentation

- LeNet-5: http://vision.stanford.edu/cs598_spring07/papers/Lecun98.pdf
- AlexNet: http://www.cs.toronto.edu/~hinton/absps/imagenet.pdf
- VGG-16: https://arxiv.org/pdf/1409.1556.pdf
- ResNets: https://www.cv-foundation.org/openaccess/content_cvpr_2016/papers/He_Deep_Residual_Learning_CVPR_2016_paper.pdf

- Network in Network: https://arxiv.org/pdf/1312.4400.pdf
- Inception Network: https://static.googleusercontent.com/media/research.google.com/en//pubs/archive/43022.pdf

Week 3. Object Localization, Object Detection, Intersection Over Union, Non-max suppression, anchor boxes, YOLO

- Convolutional Implementation of Sliding Windows: https://arxiv.org/pdf/1312.6229.pdf
- YOLO Algorithm: https://pjreddie.com/media/files/papers/yolo.pdf

Week 4. Face Recognition, One-shot Learning, Siamese network, Triplet Loss, Face Verification, Neural Style Transfer

- Siamese network: https://www.cs.toronto.edu/~ranzato/publications/taigman_cvpr14.pdf
- Triplet Loss/ FaceNet: https://arxiv.org/pdf/1503.03832.pdf
- Deep ConvNet Learning: https://cs.nyu.edu/~fergus/papers/zeilerECCV2014.pdf
- Neural Style Transfer: https://arxiv.org/pdf/1508.06576.pdf

V. Sequence Models

Week 1. Recurrent Neural Network, Types of RNNs, vanishing gradients, GRU (Gated Recurrent Unit), LSTM, Bidirectional RNN

- LSTM: https://www.bioinf.jku.at/publications/older/2604.pdf

Week 2. word embedding, cosine similarity, neural language model, Word2Vec, GloVe word vectors, Sentiment Classification

- t-SNE: https://lvdmaaten.github.io/publications/papers/JMLR_2008.pdf
- Properties of word embedding: https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/rvecs.pdf
- Neural language model: http://www.jmlr.org/papers/volume3/bengio03a/bengio03a.pdf
- Skip-gram: https://arxiv.org/pdf/1301.3781.pdf%C3%AC%E2%80%94%20%C3%AC%E2%80%9E%C5%93
- Negative sampling: https://papers.nips.cc/paper/5021-distributed-representations-of-words-and-phrases-and-their-compositionality.pdf
- GloVe: https://nlp.stanford.edu/pubs/glove.pdf
- Debiasing word embeddings: https://papers.nips.cc/paper/6228-man-is-to-computer-programmer-as-woman-is-to-homemaker-debiasing-word-embeddings.pdf

Week 3. sequence to sequence model, image captions, beam search, Bleu score, Attention Model, Speech Recognition, CTC cost, Trigger Word Detection

- Sequence to sequence model: https://papers.nips.cc/paper/5346-sequence-to-sequence-learning-with-neural-networks.pdf
- RNN Encoder-Decoder: https://arxiv.org/pdf/1406.1078.pdf

- Image captions: https://arxiv.org/pdf/1412.6632.pdf
- BLEU score: https://www.aclweb.org/anthology/P02-1040.pdf
- Attention Model: https://arxiv.org/pdf/1409.0473.pdf
- Image Caption with Visual Attention: https://arxiv.org/pdf/1502.03044.pdf
- CTC cost: https://www.cs.toronto.edu/~graves/icml_2006.pdf