Week 1

Pre-Requisite & References

**Pre Requisite:**

-​ [TensorFlow Developer Certificate Specialization](https://www.coursera.org/professional-certificates/tensorflow-in-practice).

**References:**

-​ [Fully Convolutional Networks for Semantic Segmentation](https://people.eecs.berkeley.edu/~shelhamer/data/fcn.pdf) (Long, Shelhamer & Darrell, 2014)

-​ [U-Net](https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/): Convolutional Networks for Biomedical Image Segmentation (Ronneberger, Fischer & Brox, 2015)

-​ [DeepLab](http://liangchiehchen.com/projects/DeepLab.html): Semantic Image Segmentation with Deep Convolutional Nets, Atrous Convolution, and Fully Connected CRFs (Chen, Papandreou, Kokkinos, Murphy, and Yuille, 2016)

-​ [Mask R-CNN](https://arxiv.org/abs/1703.06870) (He, Gkioxari, Dollár & Girshick, 2017)

Week 2

# References: Amazon Rekognition, PowerAI & DIGITS

-​  [Amazon Rekognition](https://aws.amazon.com/rekognition/?blog-cards.sort-by=item.additionalFields.createdDate&blog-cards.sort-order=desc)

-​ [PowerAI](https://cloud.ibm.com/catalog#services)

-​ [DIGITS](https://developer.nvidia.com/digits)

# Reference: R-CNN, Fast R-CNN

-​ ([R-CNN](https://arxiv.org/abs/1311.2524)) Rich feature hierarchies for accurate object detection and semantic segmentation (Girshick, Donahue, Darrell & Malik, 2013)

-​ [Fast R-CNN](https://arxiv.org/abs/1504.08083) (Girshick, 2015)

# Reference: TensorFlow Hub

-​ [TensorFlow Hub](https://www.tensorflow.org/hub)

# Read about the Object Detection API

Please read more about the object detection API here: ([link](https://github.com/tensorflow/models/tree/master/research/object_detection))

Please also read through the guides at the bottom of this page: ([link](https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/tf2.md))

Please also read up on checkpoints and how they work ([link](https://www.tensorflow.org/guide/checkpoint))

# Use the Object Detection API

Please go through this [official tutorial](https://colab.research.google.com/github/tensorflow/hub/blob/master/examples/colab/tf2_object_detection.ipynb) from Tensorflow to practice using the Object Detection AP

# Reference: RetinaNet, Model Garden

-​ ([RetinaNet](https://arxiv.org/abs/1708.02002" \o "" \t "_blank)) Focal Loss for Dense Object Detection (Lin, Goyal, Girshick, He & Dollár, 2017)

-​ [TensorFlow's Model Garden](https://github.com/tensorflow/models)

# Eager Few Shot Object Detection

Please go through this [official tutorial](https://colab.research.google.com/github/tensorflow/models/blob/master/research/object_detection/colab_tutorials/eager_few_shot_od_training_tf2_colab.ipynb) to practice using the Object Detection API and training a pre-trained model. This will be very similar to this week's programming assignment.

Week 3

# References: FCN

-​ [Fully Convolutional Networks for Semantic Segmentation](https://arxiv.org/abs/1411.4038) (Long, Shelhamer & Darrell, 2014)

# Reference: CamVid

-​ [Divam Gupta](https://github.com/divamgupta)'s GitHub account containing a subsample of the CamVid dataset to create a smaller dataset.

# Reference: U-Net

-​ [U-Net: Convolutional Networks for Biomedical Image Segmentation](https://arxiv.org/abs/1505.04597) (Ronneberger, Fischer & Brox, 2015)

Week 4

# Reference: GradCam

-​ [Grad-CAM: Visual Explanations from Deep Networks via Gradient-based Localization](https://arxiv.org/pdf/1610.02391.pdf) (Selvaraju, Cogswell, Das, Vedantam, Parikh & Batra, 2019)

**A​ conceptual overview of GradCam**

For an optional, conceptual look at GradCAM, please see these videos from Deeplearning.AI’s “[AI for Medical Treatment](https://www.coursera.org/learn/ai-for-medical-treatment)” course.

[Interpreting CNN models](https://www.coursera.org/learn/ai-for-medical-treatment/lecture/Us3AO/interpreting-cnn-models)

[Localization maps](https://www.coursera.org/learn/ai-for-medical-treatment/lecture/qoD4p/localization-maps)

[Heat maps](https://www.coursera.org/learn/ai-for-medical-treatment/lecture/mofKv/heat-maps)

# Reference: ZFNet

- ([ZFNet](https://arxiv.org/abs/1311.2901" \o "" \t "_blank)) Visualizing and Understanding Convolutional Networks (Zeiler & Fergus, 2013)