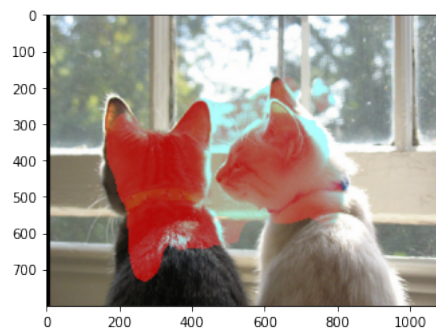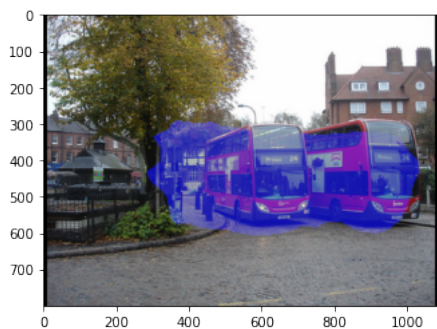# CIS680 homework 3b

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10/18/2020

1   Prediction plots

The following plots include predictions on 8 images of the inference set. The inference set contains 20% of the entire dataset. The network is able to classify multiple objects of the same class and different classes as seen below.

In the image below, the network is able to predict the bear (animal) despite its absence in the ground truth of the test dataset. This indicates that the network is able to learn features of different classes agnostically.
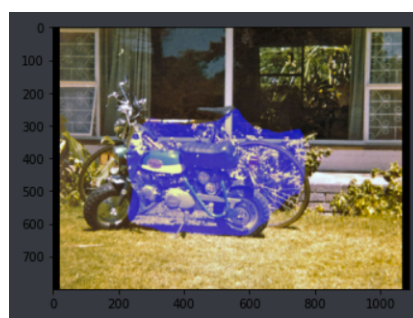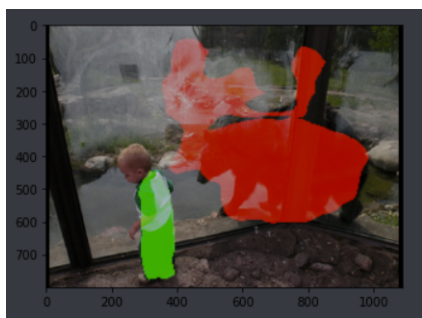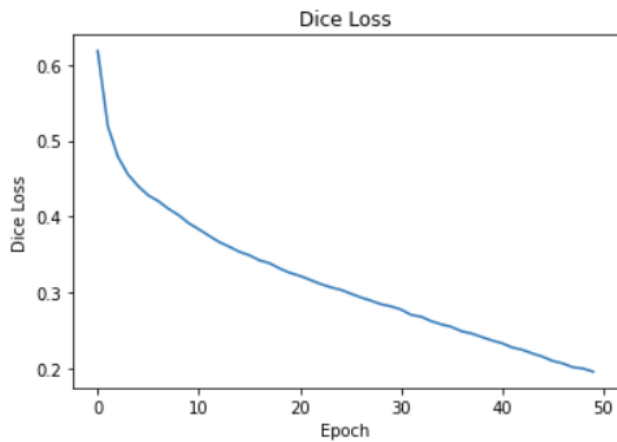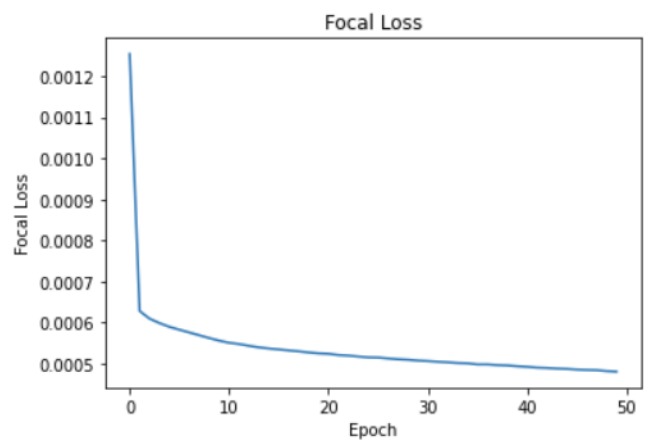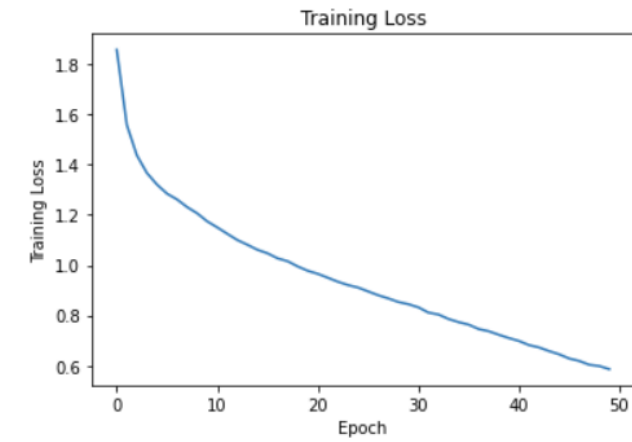

The images below show individual predictions of different objects within the same class.
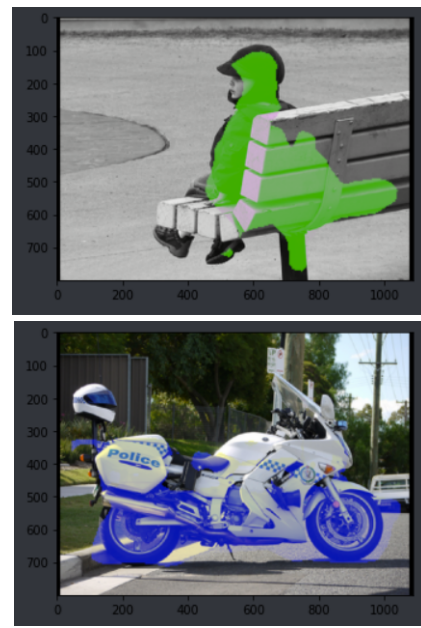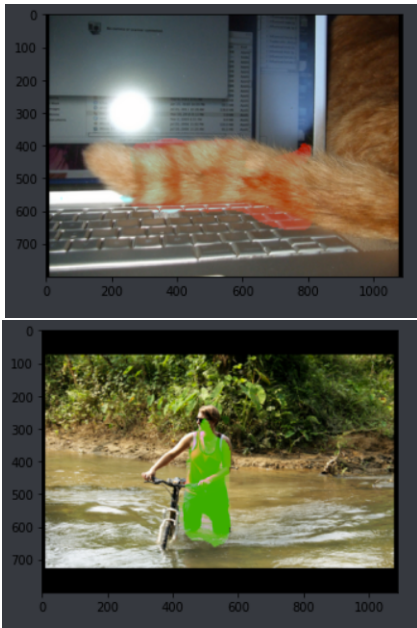
2   Loss curves

The total training loss, focal loss and dice loss vs all the epochs are plotted below.

The total loss, focal loss and dice loss (without multiplying the lambda) for a mini-batch of 100 are plotted for all the iterations below.

Training Loss for 100 mini batch

Focal Loss for 100 mini batch

Dice Loss for 100 mini batch
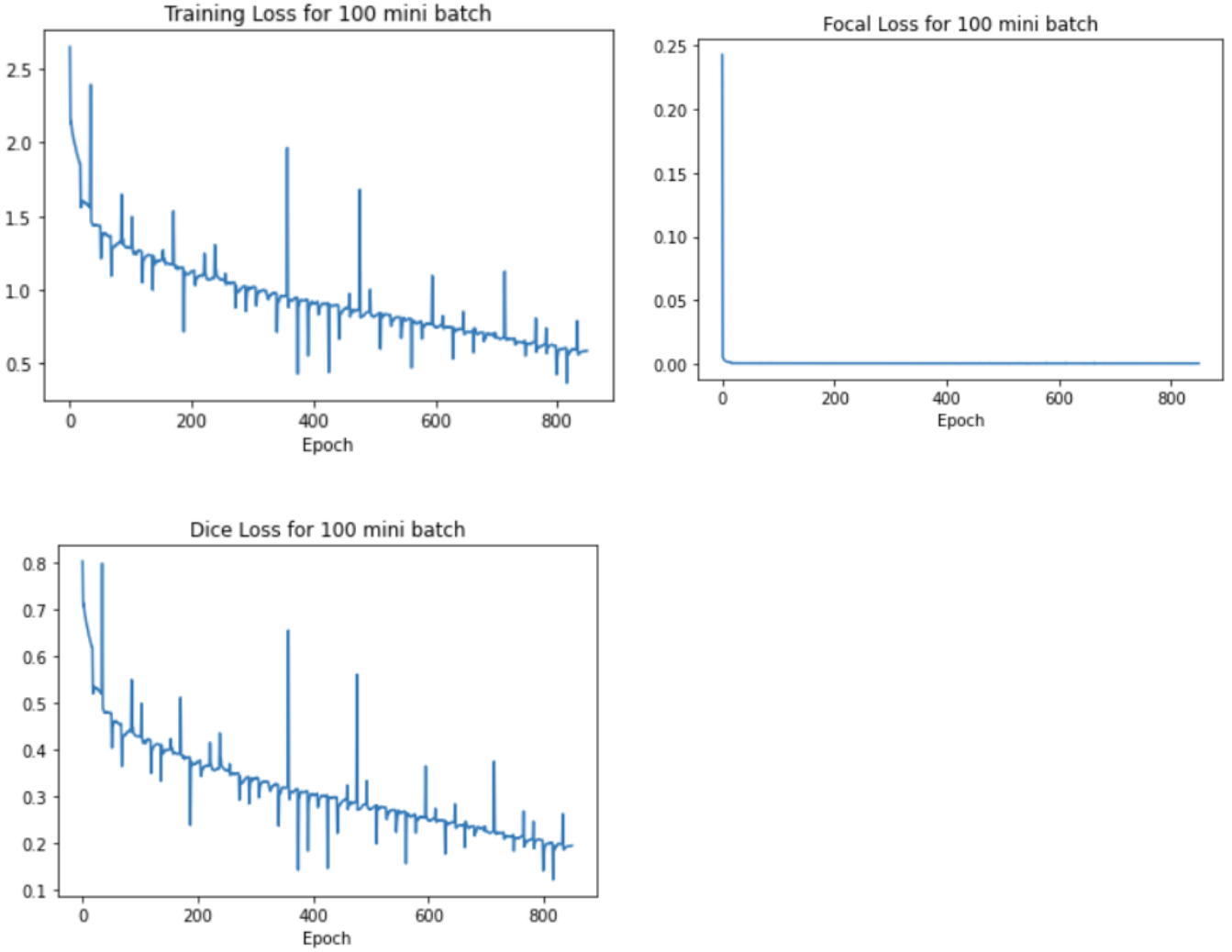
3   Parameter settings

The network has been trained on a Resnet50 backbone and two heads convolutional neural network to predict the category and instances/masks for any given image. A uniform learning rate has been set to **0.0075** (for a batch size of 2). SGD optimizer is used without weight decay and the model is trained for 50 epochs.

The learning rate for this network was fixed upon after training the model for different learning rates. Since Dice loss is the major component of the loss we plotted it with different learning rates to visualize the trend.
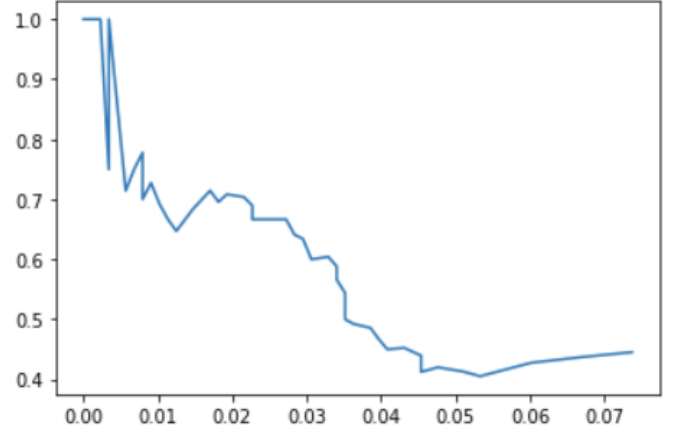
Losses for different learning rate
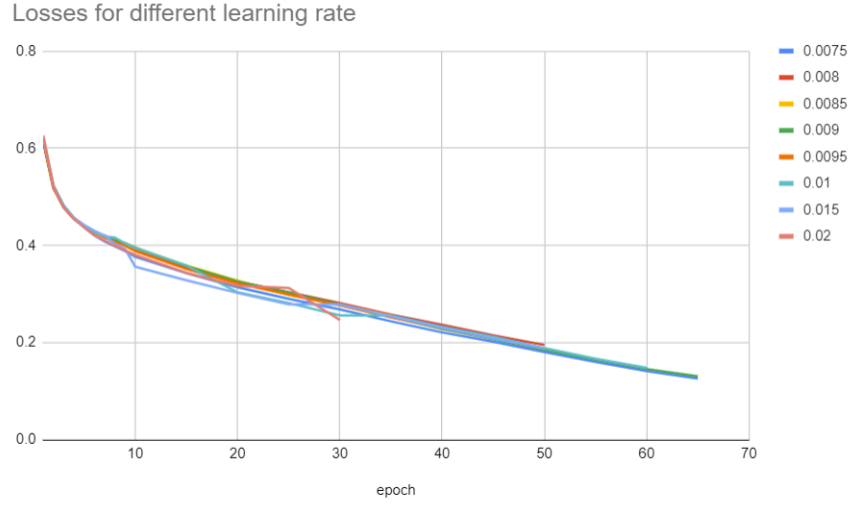
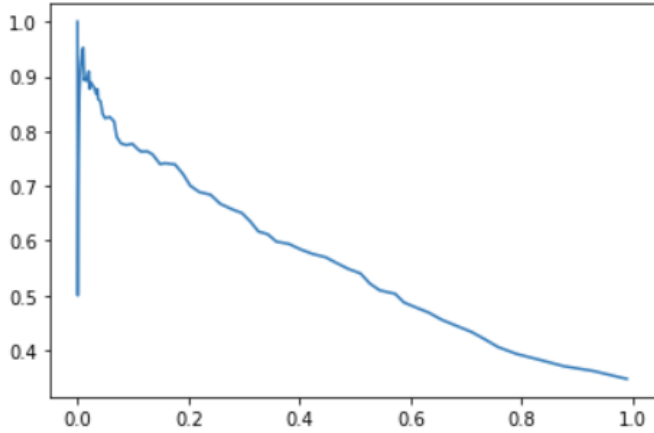# 4 mAP and Precision/Recall curves

The precision recall trend for each class is shown below. The value of mean average precision of the model is **0.2721**.
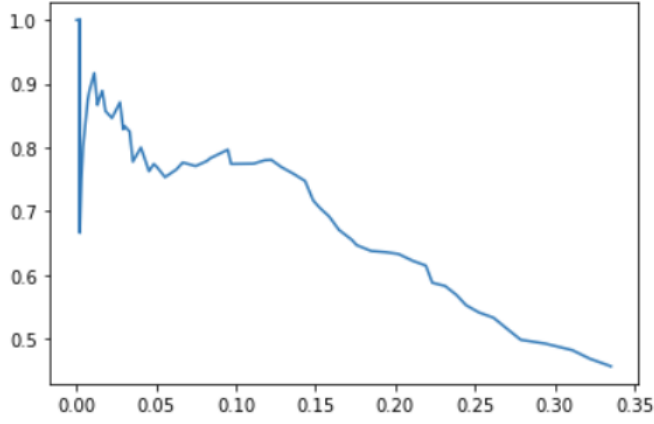
Vehicle class

Person class

Animal class

The average precision for class-1(vehicle), class-2(person) and class-3(animal) are **0.2237, 0.0417, and 0.5509** respectively. IOU_thresh used was **0.3**. There is class imbalance in the dataset, having more number of animal class images (almost only cats) and comparatively very few persons. Hence the MAP is high for the animal class. The

dataset also has unlabelled instances in each of the classes, due to which the training seems to be affected substantially. These effects are reflected in the precision-recall and AP values for each class.