

# Assignment 3 Part 1: Developing Your Own Classifier

```
import os
import numpy as np
import torch
import torch.nn as nn
import torchvision

from torchvision import transforms
from sklearn.metrics import average_precision_score
from PIL import Image, ImageDraw
import matplotlib.pyplot as plt
from kaggle_submission import output_submission_csv
from classifier import SimpleClassifier, Classifier#, AlexNet
from voc_dataloader import VocDataset, VOC_CLASSES

%matplotlib inline
%load_ext autoreload
%autoreload 2
```

```
torch.manual_seed(17)
```

```
<torch._C.Generator at 0x7f619b5323f0>
```

## Part 1B: Design your own network

In this notebook, your task is to create and train your own model for multi-label classification on VOC Pascal.

### What to do

---

1. You will make change on network architecture in `classifier.py`.
2. You may also want to change other hyperparameters to assist your training to get a better performances. Hints will be given in the below instructions.

## What to submit

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Check the submission template for details what to submit.

```
def train_classifier(train_loader, classifier, criterion, optimizer):
    classifier.train()
    loss_ = 0.0
    losses = []
    for i, (images, labels) in enumerate(train_loader):
        images, labels = images.to(device), labels.to(device)
        optimizer.zero_grad()
        logits = classifier(images)
        loss = criterion(logits, labels)
        loss.backward()
        optimizer.step()
        losses.append(loss)
    return torch.stack(losses).mean().item()
```

```

def test_classifier(test_loader, classifier, criterion, print_ind_classes=True):
    classifier.eval()
    losses = []
    with torch.no_grad():
        y_true = np.zeros((0,21))
        y_score = np.zeros((0,21))
        for i, (images, labels) in enumerate(test_loader):
            images, labels = images.to(device), labels.to(device)
            logits = classifier(images)
            y_true = np.concatenate((y_true, labels.cpu().numpy()), axis=0)
            y_score = np.concatenate((y_score, logits.cpu().numpy()), axis=0)
            loss = criterion(logits, labels)
            losses.append(loss.item())

        aps = []
        # ignore first class which is background
        for i in range(1, y_true.shape[1]):
            ap = average_precision_score(y_true[:, i], y_score[:, i])
            if print_ind_classes:
                print('----- Class: {:<12}      AP: {:>8.4f} -----'.format(i, ap))
            aps.append(ap)

        mAP = np.mean(aps)
        test_loss = np.mean(losses)
        if print_total:
            print('mAP: {0:.4f}'.format(mAP))
            print('Avg loss: {}'.format(test_loss))

    return mAP, test_loss, aps

```

```
def plot_losses(train, val, test_frequency, num_epochs):
    plt.plot(train, label="train")
    indices = [i for i in range(num_epochs) if ((i+1)%test_frequency == 0 o
    plt.plot(indices, val, label="val")
    plt.title("Loss Plot")
    plt.ylabel("Loss")
    plt.xlabel("Epoch")
    plt.legend()
    plt.show()

def plot_mAP(train, val, test_frequency, num_epochs):
    indices = [i for i in range(num_epochs) if ((i+1)%test_frequency == 0 o
    plt.plot(indices, train, label="train")
    plt.plot(indices, val, label="val")
    plt.title("mAP Plot")
    plt.ylabel("mAP")
    plt.xlabel("Epoch")
    plt.legend()
    plt.show()
```

```

def train(classifier, num_epochs, train_loader, val_loader, criterion, optimizer):
    train_losses = []
    train_mAPs = []
    val_losses = []
    val_mAPs = []

    for epoch in range(1, num_epochs+1):
        print("Starting epoch number " + str(epoch))
        train_loss = train_classifier(train_loader, classifier, criterion, optimizer)
        train_losses.append(train_loss)
        print("Loss for Training on Epoch " + str(epoch) + " is " + str(train_loss))
        if(epoch%test_frequency==0 or epoch==1):
            mAP_train, _, _ = test_classifier(train_loader, classifier, criterion, optimizer)
            train_mAPs.append(mAP_train)
            mAP_val, val_loss, _ = test_classifier(val_loader, classifier, criterion, optimizer)
            print('Evaluating classifier')
            print("Mean Precision Score for Testing on Epoch " + str(epoch) + " is " + str(mAP_val))
            val_losses.append(val_loss)
            val_mAPs.append(mAP_val)

    return classifier, train_losses, val_losses, train_mAPs, val_mAPs

```

# Developing Your Own Model

## Goal

To meet the benchmark for this assignment you will need to improve the network. Note you should have noticed pretrained Alexnet performs really well, but training Alexnet from scratch performs much worse. We hope you can design a better architecture over both the simple classifier and AlexNet to train from scratch.

## How to start

You may take inspiration from other published architectures and architectures discussed in lecture. However, you are NOT allowed to use predefined models (e.g. models from torchvision) or use pretrained weights. Training must be done from scratch with your own custom model.

## Some hints

There are a variety of different approaches you should try to improve performance from the simple classifier:

- Network architecture changes
  - Number of layers: try adding layers to make your network deeper
  - Batch normalization: adding batch norm between layers will likely give you a significant performance increase
  - Residual connections: as you increase the depth of your network, you will find that having residual connections like those in ResNet architectures will be helpful
- Optimizer: Instead of plain SGD, you may want to add a learning rate schedule, add momentum, or use one of the other optimizers you have learned about like Adam. Check the `torch.optim` package for other optimizers
- Data augmentation: You should use the `torchvision.transforms` module to try adding random resized crops and horizontal flips of the input data. Check `transforms.RandomResizedCrop` and `transforms.RandomHorizontalFlip` for this. Feel free to apply more [transforms](#) for data augmentation which can lead to better performance.
- Epochs: Once you have found a generally good hyperparameter setting try training for more epochs
- Loss function: You might want to add weighting to the `MultiLabelSoftMarginLoss` for classes that are less well represented or experiment with a different loss function

## Note

We will soon be providing some initial expectations of mAP values as a function of epoch so you can get an early idea whether your implementation works without waiting a long time for training to converge.

## What to submit

Submit your best model to Kaggle and save all plots for the writeup.

```

device = torch.device("cuda:0" if torch.cuda.is_available() else "cpu")

normalize = transforms.Normalize(mean=[0.485, 0.456, 0.406],
                                std= [0.229, 0.224, 0.225])

train_transform = transforms.Compose([
    transforms.Resize(227),
    transforms.CenterCrop(227),
    transforms.RandomResizedCrop(size=227, scale=(0.3,1)),
    transforms.RandomPerspective(),
    transforms.RandomHorizontalFlip(),
    transforms.RandomVerticalFlip(),
    transforms.RandomRotation(degrees=(-180,180)),
    transforms.ToTensor(),
    normalize
])

test_transform = transforms.Compose([
    transforms.Resize(227),
    transforms.CenterCrop(227),
    transforms.ToTensor(),
    normalize,
])

ds_train = VocDataset('VOCdevkit_2007/VOC2007/', 'train', train_transform)
ds_val = VocDataset('VOCdevkit_2007/VOC2007/', 'val', test_transform)
ds_test = VocDataset('VOCdevkit_2007/VOC2007test/', 'test', test_transform)

```

```

/workspace/assignment3_part1/voc_dataloader.py:137: VisibleDeprecationWarni
np.array(box_indices),

```

```
num_epochs = 220
test_frequency = 5
batch_size = 64

train_loader = torch.utils.data.DataLoader(dataset=ds_train,
                                             batch_size=batch_size,
                                             shuffle=True,
                                             num_workers=1)

val_loader = torch.utils.data.DataLoader(dataset=ds_val,
                                          batch_size=batch_size,
                                          shuffle=True,
                                          num_workers=1)

test_loader = torch.utils.data.DataLoader(dataset=ds_test,
                                           batch_size=batch_size,
                                           shuffle=False,
                                           num_workers=1)
```

```
classifier = Classifier().to(device)
```

```
print(classifier)
```



```

Classifier(
  (conv1_1): Conv2d(3, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1)
  (conv1_bn1): BatchNorm2d(64, eps=1e-05, momentum=0.1, affine=True, track_
  (conv1_2): Conv2d(64, 64, kernel_size=(3, 3), stride=(1, 1), padding=(1,
  (conv1_bn2): BatchNorm2d(64, eps=1e-05, momentum=0.1, affine=True, track_
  (conv1_pool): MaxPool2d(kernel_size=(2, 2), stride=(2, 2), padding=0, dil
  (conv2_1): Conv2d(64, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1,
  (conv2_bn1): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True, track
  (conv2_2): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv2_bn2): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True, track
  (conv2_pool): MaxPool2d(kernel_size=(2, 2), stride=(2, 2), padding=0, dil
  (conv3_1): Conv2d(128, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv3_bn1): BatchNorm2d(256, eps=1e-05, momentum=0.1, affine=True, track
  (conv3_2): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv3_bn2): BatchNorm2d(256, eps=1e-05, momentum=0.1, affine=True, track
  (conv3_3): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv3_bn3): BatchNorm2d(256, eps=1e-05, momentum=0.1, affine=True, track
  (conv3_4): Conv2d(256, 256, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv3_bn4): BatchNorm2d(256, eps=1e-05, momentum=0.1, affine=True, track
  (conv3_pool): MaxPool2d(kernel_size=(2, 2), stride=(2, 2), padding=0, dil
  (conv4_1): Conv2d(256, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv4_bn1): BatchNorm2d(512, eps=1e-05, momentum=0.1, affine=True, track
  (conv4_2): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv4_bn2): BatchNorm2d(512, eps=1e-05, momentum=0.1, affine=True, track
  (conv4_3): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv4_bn3): BatchNorm2d(512, eps=1e-05, momentum=0.1, affine=True, track
  (conv4_4): Conv2d(512, 512, kernel_size=(3, 3), stride=(1, 1), padding=(1
  (conv4_bn4): BatchNorm2d(512, eps=1e-05, momentum=0.1, affine=True, track
  (conv4_pool): MaxPool2d(kernel_size=(2, 2), stride=(2, 2), padding=0, dil
  (conv5_1): Conv2d(512, 256, kernel_size=(1, 1), stride=(1, 1), padding=(1
  (conv5_bn1): BatchNorm2d(256, eps=1e-05, momentum=0.1, affine=True, track
  (conv5_2): Conv2d(256, 256, kernel_size=(1, 1), stride=(1, 1), padding=(1
  (conv5_bn2): BatchNorm2d(256, eps=1e-05, momentum=0.1, affine=True, track
  (conv5_3): Conv2d(256, 128, kernel_size=(1, 1), stride=(1, 1), padding=(1
  (conv5_bn3): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True, track
  (conv5_4): Conv2d(128, 128, kernel_size=(1, 1), stride=(1, 1), padding=(1
  (conv5_bn4): BatchNorm2d(128, eps=1e-05, momentum=0.1, affine=True, track
  (conv5_pool): MaxPool2d(kernel_size=(2, 2), stride=(2, 2), padding=0, dil
  (fc1): Linear(in_features=15488, out_features=4096, bias=True)
  (drop1): Dropout(p=0.5, inplace=False)
  (fc2): Linear(in_features=4096, out_features=512, bias=True)
  (drop2): Dropout(p=0.5, inplace=False)
  (fc3): Linear(in_features=512, out_features=21, bias=True)
)

```

```
# TODO: Run your own classifier here
```

```
criterion = nn.MultiLabelSoftMarginLoss()
```

```
# optimizer = torch.optim.SGD(classifier.parameters(), lr=0.01, momentum=0.9)
optimizer = torch.optim.Adam(classifier.parameters(), lr=1e-4)
```

```
classifier, train_losses, val_losses, train_mAPs, val_mAPs = train(classifier, criterion, optimizer, train_loader, val_loader, num_epochs)
```

Starting epoch number 1

Loss for Training on Epoch 1 is 0.2925189435482025

-----	Class: aeroplane	AP:	0.1352	-----
-----	Class: bicycle	AP:	0.1170	-----
-----	Class: bird	AP:	0.0851	-----
-----	Class: boat	AP:	0.0540	-----
-----	Class: bottle	AP:	0.0495	-----
-----	Class: bus	AP:	0.0580	-----
-----	Class: car	AP:	0.1822	-----
-----	Class: cat	AP:	0.0748	-----
-----	Class: chair	AP:	0.1515	-----
-----	Class: cow	AP:	0.0310	-----
-----	Class: diningtable	AP:	0.0684	-----
-----	Class: dog	AP:	0.1202	-----
-----	Class: horse	AP:	0.0792	-----
-----	Class: motorbike	AP:	0.0904	-----
-----	Class: person	AP:	0.4459	-----
-----	Class: pottedplant	AP:	0.1052	-----
-----	Class: sheep	AP:	0.0205	-----
-----	Class: sofa	AP:	0.0972	-----
-----	Class: train	AP:	0.0862	-----
-----	Class: tvmonitor	AP:	0.0454	-----

mAP: 0.1048

Avg loss: 0.23370145373046397

Evaluating classifier

Mean Precision Score for Testing on Epoch 1 is 0.10484885236046941

Starting epoch number 2

Loss for Training on Epoch 2 is 0.25612616539001465

Starting epoch number 3

Loss for Training on Epoch 3 is 0.2459503710269928

Starting epoch number 4

Loss for Training on Epoch 4 is 0.24100370705127716

Starting epoch number 5

Loss for Training on Epoch 5 is 0.23660384118556976

-----	Class: aeroplane	AP:	0.3872	-----
-----	Class: bicycle	AP:	0.0526	-----
-----	Class: bird	AP:	0.1222	-----
-----	Class: boat	AP:	0.1342	-----
-----	Class: bottle	AP:	0.0844	-----
-----	Class: bus	AP:	0.0565	-----
-----	Class: car	AP:	0.2784	-----
-----	Class: cat	AP:	0.1516	-----
-----	Class: chair	AP:	0.2176	-----
-----	Class: cow	AP:	0.0656	-----
-----	Class: diningtable	AP:	0.1436	-----
-----	Class: dog	AP:	0.1571	-----
-----	Class: horse	AP:	0.1138	-----
-----	Class: motorbike	AP:	0.1541	-----
-----	Class: person	AP:	0.5465	-----
-----	Class: pottedplant	AP:	0.0781	-----
-----	Class: sheep	AP:	0.0544	-----
-----	Class: sofa	AP:	0.1469	-----
-----	Class: train	AP:	0.1021	-----
-----	Class: tvmonitor	AP:	0.0677	-----

mAP: 0.1557

Avg loss: 0.22377230487763883

Evaluating classifier

Mean Precision Score for Testing on Epoch 5 is 0.15572924612669997

Starting epoch number 6

Loss for Training on Epoch 6 is 0.23714704811573029

Starting epoch number 7

Loss for Training on Epoch 7 is 0.2362990379333496

Starting epoch number 8

Loss for Training on Epoch 8 is 0.2298543006181717

Starting epoch number 9

Loss for Training on Epoch 9 is 0.2293018400669098

Starting epoch number 10

Loss for Training on Epoch 10 is 0.2298445999622345

-----	Class: aeroplane	AP:	0.3792	-----
-----	Class: bicycle	AP:	0.0641	-----
-----	Class: bird	AP:	0.1277	-----
-----	Class: boat	AP:	0.2276	-----
-----	Class: bottle	AP:	0.0917	-----
-----	Class: bus	AP:	0.0828	-----
-----	Class: car	AP:	0.2786	-----
-----	Class: cat	AP:	0.2257	-----
-----	Class: chair	AP:	0.2505	-----
-----	Class: cow	AP:	0.0545	-----

-----	Class: diningtable	AP:	0.1840	-----
-----	Class: dog	AP:	0.1606	-----
-----	Class: horse	AP:	0.1943	-----
-----	Class: motorbike	AP:	0.1176	-----
-----	Class: person	AP:	0.5955	-----
-----	Class: pottedplant	AP:	0.1157	-----
-----	Class: sheep	AP:	0.1267	-----
-----	Class: sofa	AP:	0.1703	-----
-----	Class: train	AP:	0.1389	-----
-----	Class: tvmonitor	AP:	0.0844	-----

mAP: 0.1835

Avg loss: 0.2172641832381487

Evaluating classifier

Mean Precision Score for Testing on Epoch 10 is 0.18351427416742636

Starting epoch number 11

Loss for Training on Epoch 11 is 0.22531871497631073

Starting epoch number 12

Loss for Training on Epoch 12 is 0.2242054045200348

Starting epoch number 13

Loss for Training on Epoch 13 is 0.22167007625102997

Starting epoch number 14

Loss for Training on Epoch 14 is 0.22305893898010254

Starting epoch number 15

Loss for Training on Epoch 15 is 0.2214478701353073

-----	Class: aeroplane	AP:	0.4072	-----
-----	Class: bicycle	AP:	0.1066	-----
-----	Class: bird	AP:	0.1493	-----
-----	Class: boat	AP:	0.1788	-----
-----	Class: bottle	AP:	0.1148	-----
-----	Class: bus	AP:	0.0956	-----
-----	Class: car	AP:	0.3342	-----
-----	Class: cat	AP:	0.2363	-----
-----	Class: chair	AP:	0.2627	-----
-----	Class: cow	AP:	0.0627	-----
-----	Class: diningtable	AP:	0.2022	-----
-----	Class: dog	AP:	0.1743	-----
-----	Class: horse	AP:	0.3062	-----
-----	Class: motorbike	AP:	0.1827	-----
-----	Class: person	AP:	0.6454	-----
-----	Class: pottedplant	AP:	0.1062	-----
-----	Class: sheep	AP:	0.1475	-----
-----	Class: sofa	AP:	0.1958	-----
-----	Class: train	AP:	0.1213	-----
-----	Class: tvmonitor	AP:	0.0896	-----

mAP: 0.2060

Avg loss: 0.2096069749444723

Evaluating classifier

Mean Precision Score for Testing on Epoch 15 is 0.2059720416130401

Starting epoch number 16

Loss for Training on Epoch 16 is 0.22179169952869415

Starting epoch number 17

Loss for Training on Epoch 17 is 0.2180866301059723

Starting epoch number 18

Loss for Training on Epoch 18 is 0.21895694732666016

Starting epoch number 19

Loss for Training on Epoch 19 is 0.21334193646907806

Starting epoch number 20

Loss for Training on Epoch 20 is 0.2160310596227646

-----	Class: aeroplane	AP:	0.4237	-----
-----	Class: bicycle	AP:	0.0999	-----
-----	Class: bird	AP:	0.1393	-----
-----	Class: boat	AP:	0.1732	-----
-----	Class: bottle	AP:	0.1226	-----
-----	Class: bus	AP:	0.0828	-----
-----	Class: car	AP:	0.3699	-----
-----	Class: cat	AP:	0.2145	-----
-----	Class: chair	AP:	0.2541	-----
-----	Class: cow	AP:	0.0705	-----
-----	Class: diningtable	AP:	0.1690	-----
-----	Class: dog	AP:	0.1749	-----
-----	Class: horse	AP:	0.3425	-----
-----	Class: motorbike	AP:	0.2112	-----
-----	Class: person	AP:	0.6947	-----
-----	Class: pottedplant	AP:	0.1310	-----
-----	Class: sheep	AP:	0.1357	-----
-----	Class: sofa	AP:	0.1781	-----
-----	Class: train	AP:	0.1577	-----
-----	Class: tvmonitor	AP:	0.0973	-----

mAP: 0.2121

Avg loss: 0.206390580534935

Evaluating classifier

Mean Precision Score for Testing on Epoch 20 is 0.21212866413842532

Starting epoch number 21

Loss for Training on Epoch 21 is 0.21386483311653137

Starting epoch number 22

Loss for Training on Epoch 22 is 0.21611249446868896

Starting epoch number 23

Loss for Training on Epoch 23 is 0.21426840126514435

Starting epoch number 24

Loss for Training on Epoch 24 is 0.21454186737537384

Starting epoch number 25

Loss for Training on Epoch 25 is 0.21143603324890137

----- Class: aeroplane	AP: 0.4560	-----
----- Class: bicycle	AP: 0.0762	-----
----- Class: bird	AP: 0.1169	-----
----- Class: boat	AP: 0.1760	-----
----- Class: bottle	AP: 0.1225	-----
----- Class: bus	AP: 0.0978	-----
----- Class: car	AP: 0.3473	-----
----- Class: cat	AP: 0.2270	-----
----- Class: chair	AP: 0.3000	-----
----- Class: cow	AP: 0.0681	-----
----- Class: diningtable	AP: 0.2521	-----
----- Class: dog	AP: 0.1621	-----
----- Class: horse	AP: 0.2997	-----
----- Class: motorbike	AP: 0.0988	-----
----- Class: person	AP: 0.6326	-----
----- Class: pottedplant	AP: 0.1207	-----
----- Class: sheep	AP: 0.1181	-----
----- Class: sofa	AP: 0.2048	-----
----- Class: train	AP: 0.1514	-----
----- Class: tvmonitor	AP: 0.1020	-----

mAP: 0.2065

Avg loss: 0.2163195051252842

Evaluating classifier

Mean Precision Score for Testing on Epoch 25 is 0.20651146893341893

Starting epoch number 26

Loss for Training on Epoch 26 is 0.2119547575712204

Starting epoch number 27

Loss for Training on Epoch 27 is 0.21065738797187805

Starting epoch number 28

Loss for Training on Epoch 28 is 0.20945976674556732

Starting epoch number 29

Loss for Training on Epoch 29 is 0.2080259770154953

Starting epoch number 30

Loss for Training on Epoch 30 is 0.21413026750087738

----- Class: aeroplane	AP: 0.3852	-----
----- Class: bicycle	AP: 0.0773	-----
----- Class: bird	AP: 0.1512	-----
----- Class: boat	AP: 0.1657	-----
----- Class: bottle	AP: 0.1187	-----
----- Class: bus	AP: 0.0867	-----
----- Class: car	AP: 0.3141	-----
----- Class: cat	AP: 0.2435	-----
----- Class: chair	AP: 0.2448	-----

-----	Class: cow	AP:	0.0765	-----
-----	Class: diningtable	AP:	0.1661	-----
-----	Class: dog	AP:	0.1908	-----
-----	Class: horse	AP:	0.2422	-----
-----	Class: motorbike	AP:	0.1618	-----
-----	Class: person	AP:	0.5914	-----
-----	Class: pottedplant	AP:	0.1387	-----
-----	Class: sheep	AP:	0.1433	-----
-----	Class: sofa	AP:	0.1924	-----
-----	Class: train	AP:	0.1011	-----
-----	Class: tvmonitor	AP:	0.0874	-----

mAP: 0.1939

Avg loss: 0.22133502922952175

Evaluating classifier

Mean Precision Score for Testing on Epoch 30 is 0.19394395558547042

Starting epoch number 31

Loss for Training on Epoch 31 is 0.21375472843647003

Starting epoch number 32

Loss for Training on Epoch 32 is 0.2072724550962448

Starting epoch number 33

Loss for Training on Epoch 33 is 0.20740798115730286

Starting epoch number 34

Loss for Training on Epoch 34 is 0.2070954144001007

Starting epoch number 35

Loss for Training on Epoch 35 is 0.21015672385692596

-----	Class: aeroplane	AP:	0.4367	-----
-----	Class: bicycle	AP:	0.1497	-----
-----	Class: bird	AP:	0.1464	-----
-----	Class: boat	AP:	0.1274	-----
-----	Class: bottle	AP:	0.1484	-----
-----	Class: bus	AP:	0.1115	-----
-----	Class: car	AP:	0.4134	-----
-----	Class: cat	AP:	0.2620	-----
-----	Class: chair	AP:	0.2933	-----
-----	Class: cow	AP:	0.0821	-----
-----	Class: diningtable	AP:	0.2605	-----
-----	Class: dog	AP:	0.1716	-----
-----	Class: horse	AP:	0.3787	-----
-----	Class: motorbike	AP:	0.2887	-----
-----	Class: person	AP:	0.7170	-----
-----	Class: pottedplant	AP:	0.1195	-----
-----	Class: sheep	AP:	0.1275	-----
-----	Class: sofa	AP:	0.2136	-----
-----	Class: train	AP:	0.2504	-----
-----	Class: tvmonitor	AP:	0.1141	-----

```
mAP: 0.2406
Avg loss: 0.20513488464057444
Evaluating classifier
Mean Precision Score for Testing on Epoch 35 is 0.24061798644374455
Starting epoch number 36
Loss for Training on Epoch 36 is 0.20654891431331635
Starting epoch number 37
Loss for Training on Epoch 37 is 0.20717106759548187
Starting epoch number 38
Loss for Training on Epoch 38 is 0.204878568649292
Starting epoch number 39
Loss for Training on Epoch 39 is 0.20350180566310883
Starting epoch number 40
Loss for Training on Epoch 40 is 0.2056141346693039
----- Class: aeroplane      AP: 0.4632 -----
----- Class: bicycle        AP: 0.0874 -----
----- Class: bird           AP: 0.1499 -----
----- Class: boat           AP: 0.2117 -----
----- Class: bottle         AP: 0.0996 -----
----- Class: bus            AP: 0.0999 -----
----- Class: car            AP: 0.3959 -----
----- Class: cat            AP: 0.2450 -----
----- Class: chair          AP: 0.3127 -----
----- Class: cow            AP: 0.0739 -----
----- Class: diningtable    AP: 0.1655 -----
----- Class: dog            AP: 0.2023 -----
----- Class: horse          AP: 0.2918 -----
----- Class: motorbike      AP: 0.2475 -----
----- Class: person         AP: 0.7037 -----
----- Class: pottedplant    AP: 0.1210 -----
----- Class: sheep          AP: 0.1535 -----
----- Class: sofa           AP: 0.2124 -----
----- Class: train          AP: 0.1368 -----
----- Class: tvmonitor      AP: 0.0939 -----
mAP: 0.2234
Avg loss: 0.21437875889241695
Evaluating classifier
Mean Precision Score for Testing on Epoch 40 is 0.22338192878785185
Starting epoch number 41
Loss for Training on Epoch 41 is 0.20516467094421387
Starting epoch number 42
Loss for Training on Epoch 42 is 0.20106247067451477
Starting epoch number 43
Loss for Training on Epoch 43 is 0.20113728940486908
Starting epoch number 44
```



Loss for Training on Epoch 44 is 0.19956214725971222

Starting epoch number 45

Loss for Training on Epoch 45 is 0.20022426545619965

-----	Class: aeroplane	AP:	0.4896	-----
-----	Class: bicycle	AP:	0.0735	-----
-----	Class: bird	AP:	0.1455	-----
-----	Class: boat	AP:	0.2104	-----
-----	Class: bottle	AP:	0.1336	-----
-----	Class: bus	AP:	0.1032	-----
-----	Class: car	AP:	0.4038	-----
-----	Class: cat	AP:	0.3160	-----
-----	Class: chair	AP:	0.3001	-----
-----	Class: cow	AP:	0.0722	-----
-----	Class: diningtable	AP:	0.2356	-----
-----	Class: dog	AP:	0.2015	-----
-----	Class: horse	AP:	0.3496	-----
-----	Class: motorbike	AP:	0.1147	-----
-----	Class: person	AP:	0.7071	-----
-----	Class: pottedplant	AP:	0.1495	-----
-----	Class: sheep	AP:	0.1156	-----
-----	Class: sofa	AP:	0.1853	-----
-----	Class: train	AP:	0.2418	-----
-----	Class: tvmonitor	AP:	0.1085	-----

mAP: 0.2329

Avg loss: 0.2126306150108576

Evaluating classifier

Mean Precision Score for Testing on Epoch 45 is 0.2328600167515574

Starting epoch number 46

Loss for Training on Epoch 46 is 0.19898849725723267

Starting epoch number 47

Loss for Training on Epoch 47 is 0.21017256379127502

Starting epoch number 48

Loss for Training on Epoch 48 is 0.2013702392578125

Starting epoch number 49

Loss for Training on Epoch 49 is 0.20219166576862335

Starting epoch number 50

Loss for Training on Epoch 50 is 0.19899332523345947

-----	Class: aeroplane	AP:	0.4738	-----
-----	Class: bicycle	AP:	0.0517	-----
-----	Class: bird	AP:	0.1295	-----
-----	Class: boat	AP:	0.1369	-----
-----	Class: bottle	AP:	0.1020	-----
-----	Class: bus	AP:	0.0633	-----
-----	Class: car	AP:	0.3561	-----
-----	Class: cat	AP:	0.3049	-----

-----	Class: chair	AP:	0.2553	-----
-----	Class: cow	AP:	0.0874	-----
-----	Class: diningtable	AP:	0.1603	-----
-----	Class: dog	AP:	0.2390	-----
-----	Class: horse	AP:	0.2194	-----
-----	Class: motorbike	AP:	0.0599	-----
-----	Class: person	AP:	0.6847	-----
-----	Class: pottedplant	AP:	0.0873	-----
-----	Class: sheep	AP:	0.1691	-----
-----	Class: sofa	AP:	0.1978	-----
-----	Class: train	AP:	0.2219	-----
-----	Class: tvmonitor	AP:	0.0965	-----

mAP: 0.2048

Avg loss: 0.2285123836249113

Evaluating classifier

Mean Precision Score for Testing on Epoch 50 is 0.20483560921737332

Starting epoch number 51

Loss for Training on Epoch 51 is 0.1964704841375351

Starting epoch number 52

Loss for Training on Epoch 52 is 0.19498899579048157

Starting epoch number 53

Loss for Training on Epoch 53 is 0.1956622302532196

Starting epoch number 54

Loss for Training on Epoch 54 is 0.1941804736852646

Starting epoch number 55

Loss for Training on Epoch 55 is 0.19618363678455353

-----	Class: aeroplane	AP:	0.4908	-----
-----	Class: bicycle	AP:	0.0779	-----
-----	Class: bird	AP:	0.1713	-----
-----	Class: boat	AP:	0.1794	-----
-----	Class: bottle	AP:	0.1258	-----
-----	Class: bus	AP:	0.1295	-----
-----	Class: car	AP:	0.3736	-----
-----	Class: cat	AP:	0.3116	-----
-----	Class: chair	AP:	0.3527	-----
-----	Class: cow	AP:	0.0744	-----
-----	Class: diningtable	AP:	0.2730	-----
-----	Class: dog	AP:	0.2392	-----
-----	Class: horse	AP:	0.3884	-----
-----	Class: motorbike	AP:	0.2427	-----
-----	Class: person	AP:	0.7427	-----
-----	Class: pottedplant	AP:	0.1760	-----
-----	Class: sheep	AP:	0.1220	-----
-----	Class: sofa	AP:	0.2487	-----
-----	Class: train	AP:	0.2909	-----

```
----- Class: tvmonitor          AP:  0.1326 -----
mAP: 0.2572
Avg loss: 0.20364508889615535
Evaluating classifier
Mean Precision Score for Testing on Epoch 55 is 0.2571640027486515
Starting epoch number 56
Loss for Training on Epoch 56 is 0.1933538019657135
Starting epoch number 57
Loss for Training on Epoch 57 is 0.19811920821666718
Starting epoch number 58
Loss for Training on Epoch 58 is 0.19420532882213593
Starting epoch number 59
Loss for Training on Epoch 59 is 0.19613681733608246
Starting epoch number 60
Loss for Training on Epoch 60 is 0.1930803805589676
----- Class: aeroplane          AP:  0.4758 -----
----- Class: bicycle           AP:  0.1184 -----
----- Class: bird              AP:  0.1710 -----
----- Class: boat              AP:  0.2340 -----
----- Class: bottle            AP:  0.1519 -----
----- Class: bus               AP:  0.1300 -----
----- Class: car               AP:  0.4572 -----
----- Class: cat               AP:  0.3086 -----
----- Class: chair             AP:  0.3823 -----
----- Class: cow               AP:  0.0852 -----
----- Class: diningtable       AP:  0.2977 -----
----- Class: dog               AP:  0.2076 -----
----- Class: horse             AP:  0.4365 -----
----- Class: motorbike         AP:  0.2703 -----
----- Class: person            AP:  0.7612 -----
----- Class: pottedplant       AP:  0.2012 -----
----- Class: sheep             AP:  0.1509 -----
----- Class: sofa              AP:  0.2761 -----
----- Class: train             AP:  0.3132 -----
----- Class: tvmonitor         AP:  0.1668 -----
mAP: 0.2798
Avg loss: 0.1951543226838112
Evaluating classifier
Mean Precision Score for Testing on Epoch 60 is 0.27980114045299354
Starting epoch number 61
Loss for Training on Epoch 61 is 0.1913294643163681
Starting epoch number 62
Loss for Training on Epoch 62 is 0.1965252012014389
Starting epoch number 63
Loss for Training on Epoch 63 is 0.19002629816532135
```

Starting epoch number 64

Loss for Training on Epoch 64 is 0.19061173498630524

Starting epoch number 65

Loss for Training on Epoch 65 is 0.1884617805480957

-----	Class: aeroplane	AP:	0.5158	-----
-----	Class: bicycle	AP:	0.1677	-----
-----	Class: bird	AP:	0.1921	-----
-----	Class: boat	AP:	0.2659	-----
-----	Class: bottle	AP:	0.1313	-----
-----	Class: bus	AP:	0.1626	-----
-----	Class: car	AP:	0.4621	-----
-----	Class: cat	AP:	0.3387	-----
-----	Class: chair	AP:	0.3788	-----
-----	Class: cow	AP:	0.0874	-----
-----	Class: diningtable	AP:	0.2979	-----
-----	Class: dog	AP:	0.2425	-----
-----	Class: horse	AP:	0.3974	-----
-----	Class: motorbike	AP:	0.2785	-----
-----	Class: person	AP:	0.7621	-----
-----	Class: pottedplant	AP:	0.2004	-----
-----	Class: sheep	AP:	0.1850	-----
-----	Class: sofa	AP:	0.2631	-----
-----	Class: train	AP:	0.2982	-----
-----	Class: tvmonitor	AP:	0.2090	-----

mAP: 0.2918

Avg loss: 0.19540488645434378

Evaluating classifier

Mean Precision Score for Testing on Epoch 65 is 0.2918282374438242

Starting epoch number 66

Loss for Training on Epoch 66 is 0.19305302202701569

Starting epoch number 67

Loss for Training on Epoch 67 is 0.195455864071846

Starting epoch number 68

Loss for Training on Epoch 68 is 0.18901410698890686

Starting epoch number 69

Loss for Training on Epoch 69 is 0.18997596204280853

Starting epoch number 70

Loss for Training on Epoch 70 is 0.18888311088085175

-----	Class: aeroplane	AP:	0.4928	-----
-----	Class: bicycle	AP:	0.1597	-----
-----	Class: bird	AP:	0.1927	-----
-----	Class: boat	AP:	0.3066	-----
-----	Class: bottle	AP:	0.1196	-----
-----	Class: bus	AP:	0.1604	-----
-----	Class: car	AP:	0.4462	-----

-----	Class: cat	AP:	0.3454	-----
-----	Class: chair	AP:	0.3996	-----
-----	Class: cow	AP:	0.0783	-----
-----	Class: diningtable	AP:	0.2865	-----
-----	Class: dog	AP:	0.2281	-----
-----	Class: horse	AP:	0.3765	-----
-----	Class: motorbike	AP:	0.4011	-----
-----	Class: person	AP:	0.7569	-----
-----	Class: pottedplant	AP:	0.2441	-----
-----	Class: sheep	AP:	0.1802	-----
-----	Class: sofa	AP:	0.2104	-----
-----	Class: train	AP:	0.3554	-----
-----	Class: tvmonitor	AP:	0.2161	-----

mAP: 0.2978

Avg loss: 0.19721623361110688

Evaluating classifier

Mean Precision Score for Testing on Epoch 70 is 0.2978283142861796

Starting epoch number 71

Loss for Training on Epoch 71 is 0.18835726380348206

Starting epoch number 72

Loss for Training on Epoch 72 is 0.18525883555412292

Starting epoch number 73

Loss for Training on Epoch 73 is 0.1880384236574173

Starting epoch number 74

Loss for Training on Epoch 74 is 0.1885732263326645

Starting epoch number 75

Loss for Training on Epoch 75 is 0.1880684643983841

-----	Class: aeroplane	AP:	0.5147	-----
-----	Class: bicycle	AP:	0.1326	-----
-----	Class: bird	AP:	0.1569	-----
-----	Class: boat	AP:	0.2524	-----
-----	Class: bottle	AP:	0.1131	-----
-----	Class: bus	AP:	0.1163	-----
-----	Class: car	AP:	0.4216	-----
-----	Class: cat	AP:	0.3367	-----
-----	Class: chair	AP:	0.3405	-----
-----	Class: cow	AP:	0.0917	-----
-----	Class: diningtable	AP:	0.2506	-----
-----	Class: dog	AP:	0.2613	-----
-----	Class: horse	AP:	0.3881	-----
-----	Class: motorbike	AP:	0.2305	-----
-----	Class: person	AP:	0.7799	-----
-----	Class: pottedplant	AP:	0.1785	-----
-----	Class: sheep	AP:	0.1823	-----
-----	Class: sofa	AP:	0.2325	-----

----- Class: train AP: 0.3467 -----  
----- Class: tvmonitor AP: 0.1462 -----

mAP: 0.2737

Avg loss: 0.19817063361406326

Evaluating classifier

Mean Precision Score for Testing on Epoch 75 is 0.2736520757876445

Starting epoch number 76

Loss for Training on Epoch 76 is 0.18400278687477112

Starting epoch number 77

Loss for Training on Epoch 77 is 0.18722134828567505

Starting epoch number 78

Loss for Training on Epoch 78 is 0.18495237827301025

Starting epoch number 79

Loss for Training on Epoch 79 is 0.1837991327047348

Starting epoch number 80

Loss for Training on Epoch 80 is 0.1827940046787262

----- Class: aeroplane	AP: 0.5190	-----
----- Class: bicycle	AP: 0.2029	-----
----- Class: bird	AP: 0.2245	-----
----- Class: boat	AP: 0.2437	-----
----- Class: bottle	AP: 0.1381	-----
----- Class: bus	AP: 0.1492	-----
----- Class: car	AP: 0.5318	-----
----- Class: cat	AP: 0.3384	-----
----- Class: chair	AP: 0.3984	-----
----- Class: cow	AP: 0.0938	-----
----- Class: diningtable	AP: 0.3422	-----
----- Class: dog	AP: 0.2726	-----
----- Class: horse	AP: 0.3964	-----
----- Class: motorbike	AP: 0.3910	-----
----- Class: person	AP: 0.7851	-----
----- Class: pottedplant	AP: 0.2027	-----
----- Class: sheep	AP: 0.1938	-----
----- Class: sofa	AP: 0.2455	-----
----- Class: train	AP: 0.3568	-----
----- Class: tvmonitor	AP: 0.2149	-----

mAP: 0.3120

Avg loss: 0.1874357733875513

Evaluating classifier

Mean Precision Score for Testing on Epoch 80 is 0.31204284292321627

Starting epoch number 81

Loss for Training on Epoch 81 is 0.18449459969997406

Starting epoch number 82

Loss for Training on Epoch 82 is 0.185738667845726

Starting epoch number 83

Loss for Training on Epoch 83 is 0.18310581147670746

Starting epoch number 84

Loss for Training on Epoch 84 is 0.17955508828163147

Starting epoch number 85

Loss for Training on Epoch 85 is 0.18172632157802582

-----	Class: aeroplane	AP:	0.5147	-----
-----	Class: bicycle	AP:	0.2005	-----
-----	Class: bird	AP:	0.2273	-----
-----	Class: boat	AP:	0.2958	-----
-----	Class: bottle	AP:	0.1201	-----
-----	Class: bus	AP:	0.1315	-----
-----	Class: car	AP:	0.4950	-----
-----	Class: cat	AP:	0.3228	-----
-----	Class: chair	AP:	0.4156	-----
-----	Class: cow	AP:	0.0908	-----
-----	Class: diningtable	AP:	0.3501	-----
-----	Class: dog	AP:	0.2402	-----
-----	Class: horse	AP:	0.4227	-----
-----	Class: motorbike	AP:	0.4220	-----
-----	Class: person	AP:	0.7791	-----
-----	Class: pottedplant	AP:	0.2362	-----
-----	Class: sheep	AP:	0.1940	-----
-----	Class: sofa	AP:	0.2445	-----
-----	Class: train	AP:	0.3484	-----
-----	Class: tvmonitor	AP:	0.2113	-----

mAP: 0.3131

Avg loss: 0.18796622566878796

Evaluating classifier

Mean Precision Score for Testing on Epoch 85 is 0.31313095069909025

Starting epoch number 86

Loss for Training on Epoch 86 is 0.18246081471443176

Starting epoch number 87

Loss for Training on Epoch 87 is 0.18540893495082855

Starting epoch number 88

Loss for Training on Epoch 88 is 0.1810510903596878

Starting epoch number 89

Loss for Training on Epoch 89 is 0.18239746987819672

Starting epoch number 90

Loss for Training on Epoch 90 is 0.18225185573101044

-----	Class: aeroplane	AP:	0.5077	-----
-----	Class: bicycle	AP:	0.1770	-----
-----	Class: bird	AP:	0.2426	-----
-----	Class: boat	AP:	0.2361	-----
-----	Class: bottle	AP:	0.1427	-----
-----	Class: bus	AP:	0.1118	-----

-----	Class: car	AP:	0.4711	-----
-----	Class: cat	AP:	0.3398	-----
-----	Class: chair	AP:	0.4172	-----
-----	Class: cow	AP:	0.0987	-----
-----	Class: diningtable	AP:	0.3499	-----
-----	Class: dog	AP:	0.2735	-----
-----	Class: horse	AP:	0.4253	-----
-----	Class: motorbike	AP:	0.4155	-----
-----	Class: person	AP:	0.7988	-----
-----	Class: pottedplant	AP:	0.1953	-----
-----	Class: sheep	AP:	0.1829	-----
-----	Class: sofa	AP:	0.2168	-----
-----	Class: train	AP:	0.3399	-----
-----	Class: tvmonitor	AP:	0.2325	-----

mAP: 0.3088

Avg loss: 0.18912985026836396

Evaluating classifier

Mean Precision Score for Testing on Epoch 90 is 0.3087544722820693

Starting epoch number 91

Loss for Training on Epoch 91 is 0.1794406920671463

Starting epoch number 92

Loss for Training on Epoch 92 is 0.17933619022369385

Starting epoch number 93

Loss for Training on Epoch 93 is 0.17795097827911377

Starting epoch number 94

Loss for Training on Epoch 94 is 0.17659930884838104

Starting epoch number 95

Loss for Training on Epoch 95 is 0.17674197256565094

-----	Class: aeroplane	AP:	0.5426	-----
-----	Class: bicycle	AP:	0.0982	-----
-----	Class: bird	AP:	0.1860	-----
-----	Class: boat	AP:	0.2888	-----
-----	Class: bottle	AP:	0.1103	-----
-----	Class: bus	AP:	0.0849	-----
-----	Class: car	AP:	0.4557	-----
-----	Class: cat	AP:	0.3489	-----
-----	Class: chair	AP:	0.3289	-----
-----	Class: cow	AP:	0.0855	-----
-----	Class: diningtable	AP:	0.2692	-----
-----	Class: dog	AP:	0.2697	-----
-----	Class: horse	AP:	0.3169	-----
-----	Class: motorbike	AP:	0.1721	-----
-----	Class: person	AP:	0.7383	-----
-----	Class: pottedplant	AP:	0.1526	-----
-----	Class: sheep	AP:	0.2075	-----



-----	Class: sofa	AP:	0.2689	-----
-----	Class: train	AP:	0.3593	-----
-----	Class: tvmonitor	AP:	0.1403	-----

mAP: 0.2712

Avg loss: 0.21776705421507359

Evaluating classifier

Mean Precision Score for Testing on Epoch 95 is 0.27121977669400305

Starting epoch number 96

Loss for Training on Epoch 96 is 0.1778525561094284

Starting epoch number 97

Loss for Training on Epoch 97 is 0.17980550229549408

Starting epoch number 98

Loss for Training on Epoch 98 is 0.17916999757289886

Starting epoch number 99

Loss for Training on Epoch 99 is 0.17632070183753967

Starting epoch number 100

Loss for Training on Epoch 100 is 0.1763889342546463

-----	Class: aeroplane	AP:	0.5585	-----
-----	Class: bicycle	AP:	0.2113	-----
-----	Class: bird	AP:	0.2029	-----
-----	Class: boat	AP:	0.3375	-----
-----	Class: bottle	AP:	0.1320	-----
-----	Class: bus	AP:	0.2066	-----
-----	Class: car	AP:	0.5393	-----
-----	Class: cat	AP:	0.3721	-----
-----	Class: chair	AP:	0.4327	-----
-----	Class: cow	AP:	0.0964	-----
-----	Class: diningtable	AP:	0.3633	-----
-----	Class: dog	AP:	0.2919	-----
-----	Class: horse	AP:	0.4579	-----
-----	Class: motorbike	AP:	0.4810	-----
-----	Class: person	AP:	0.8057	-----
-----	Class: pottedplant	AP:	0.2223	-----
-----	Class: sheep	AP:	0.1710	-----
-----	Class: sofa	AP:	0.2461	-----
-----	Class: train	AP:	0.3850	-----
-----	Class: tvmonitor	AP:	0.2206	-----

mAP: 0.3367

Avg loss: 0.18452093973755837

Evaluating classifier

Mean Precision Score for Testing on Epoch 100 is 0.33671495364999204

Starting epoch number 101

Loss for Training on Epoch 101 is 0.17753233015537262

Starting epoch number 102

Loss for Training on Epoch 102 is 0.1766238957643509

```

Starting epoch number 103
Loss for Training on Epoch 103 is 0.17749325931072235
Starting epoch number 104
Loss for Training on Epoch 104 is 0.1787945032119751
Starting epoch number 105
Loss for Training on Epoch 105 is 0.1764296591281891
----- Class: aeroplane      AP:  0.5839  -----
----- Class: bicycle       AP:  0.2151  -----
----- Class: bird          AP:  0.2165  -----
----- Class: boat          AP:  0.3741  -----
----- Class: bottle        AP:  0.1469  -----
----- Class: bus           AP:  0.1782  -----
----- Class: car           AP:  0.5453  -----
----- Class: cat           AP:  0.3661  -----
----- Class: chair         AP:  0.4130  -----
----- Class: cow           AP:  0.1159  -----
----- Class: diningtable   AP:  0.3811  -----
----- Class: dog           AP:  0.2678  -----
----- Class: horse         AP:  0.4675  -----
----- Class: motorbike     AP:  0.5398  -----
----- Class: person        AP:  0.8003  -----
----- Class: pottedplant   AP:  0.2100  -----
----- Class: sheep         AP:  0.1732  -----
----- Class: sofa          AP:  0.2316  -----
----- Class: train         AP:  0.4181  -----
----- Class: tvmonitor     AP:  0.1886  -----
mAP: 0.3416
Avg loss: 0.18362870253622532
Evaluating classifier
Mean Precision Score for Testing on Epoch 105 is 0.3416405230396874
Starting epoch number 106
Loss for Training on Epoch 106 is 0.17466728389263153
Starting epoch number 107
Loss for Training on Epoch 107 is 0.17214420437812805
Starting epoch number 108
Loss for Training on Epoch 108 is 0.1731700897216797
Starting epoch number 109
Loss for Training on Epoch 109 is 0.17357270419597626
Starting epoch number 110
Loss for Training on Epoch 110 is 0.18130990862846375
----- Class: aeroplane      AP:  0.5262  -----
----- Class: bicycle       AP:  0.1161  -----
----- Class: bird          AP:  0.2448  -----
----- Class: boat          AP:  0.3283  -----
----- Class: bottle        AP:  0.1290  -----

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-----	Class: bus	AP:	0.1056	-----
-----	Class: car	AP:	0.4457	-----
-----	Class: cat	AP:	0.3589	-----
-----	Class: chair	AP:	0.4024	-----
-----	Class: cow	AP:	0.1197	-----
-----	Class: diningtable	AP:	0.3140	-----
-----	Class: dog	AP:	0.2748	-----
-----	Class: horse	AP:	0.4575	-----
-----	Class: motorbike	AP:	0.3763	-----
-----	Class: person	AP:	0.7999	-----
-----	Class: pottedplant	AP:	0.1909	-----
-----	Class: sheep	AP:	0.1909	-----
-----	Class: sofa	AP:	0.2770	-----
-----	Class: train	AP:	0.3626	-----
-----	Class: tvmonitor	AP:	0.1858	-----

mAP: 0.3103

Avg loss: 0.1948418091982603

Evaluating classifier

Mean Precision Score for Testing on Epoch 110 is 0.31031154160863894

Starting epoch number 111

Loss for Training on Epoch 111 is 0.17718884348869324

Starting epoch number 112

Loss for Training on Epoch 112 is 0.1740882694721222

Starting epoch number 113

Loss for Training on Epoch 113 is 0.1756453812122345

Starting epoch number 114

Loss for Training on Epoch 114 is 0.17389769852161407

Starting epoch number 115

Loss for Training on Epoch 115 is 0.17143048346042633

-----	Class: aeroplane	AP:	0.5628	-----
-----	Class: bicycle	AP:	0.2361	-----
-----	Class: bird	AP:	0.2728	-----
-----	Class: boat	AP:	0.3765	-----
-----	Class: bottle	AP:	0.1401	-----
-----	Class: bus	AP:	0.1541	-----
-----	Class: car	AP:	0.5097	-----
-----	Class: cat	AP:	0.3871	-----
-----	Class: chair	AP:	0.4317	-----
-----	Class: cow	AP:	0.1224	-----
-----	Class: diningtable	AP:	0.3286	-----
-----	Class: dog	AP:	0.2566	-----
-----	Class: horse	AP:	0.5161	-----
-----	Class: motorbike	AP:	0.4741	-----
-----	Class: person	AP:	0.8072	-----
-----	Class: pottedplant	AP:	0.2285	-----

-----	Class: sheep	AP:	0.1594	-----
-----	Class: sofa	AP:	0.2428	-----
-----	Class: train	AP:	0.4856	-----
-----	Class: tvmonitor	AP:	0.2561	-----

mAP: 0.3474

Avg loss: 0.1796851646155119

Evaluating classifier

Mean Precision Score for Testing on Epoch 115 is 0.3474119211038059

Starting epoch number 116

Loss for Training on Epoch 116 is 0.17019341886043549

Starting epoch number 117

Loss for Training on Epoch 117 is 0.17159968614578247

Starting epoch number 118

Loss for Training on Epoch 118 is 0.17658376693725586

Starting epoch number 119

Loss for Training on Epoch 119 is 0.1706826239824295

Starting epoch number 120

Loss for Training on Epoch 120 is 0.16892795264720917

-----	Class: aeroplane	AP:	0.5540	-----
-----	Class: bicycle	AP:	0.2238	-----
-----	Class: bird	AP:	0.2795	-----
-----	Class: boat	AP:	0.3967	-----
-----	Class: bottle	AP:	0.1224	-----
-----	Class: bus	AP:	0.1891	-----
-----	Class: car	AP:	0.5230	-----
-----	Class: cat	AP:	0.3657	-----
-----	Class: chair	AP:	0.4274	-----
-----	Class: cow	AP:	0.1168	-----
-----	Class: diningtable	AP:	0.3466	-----
-----	Class: dog	AP:	0.2742	-----
-----	Class: horse	AP:	0.4577	-----
-----	Class: motorbike	AP:	0.4508	-----
-----	Class: person	AP:	0.7988	-----
-----	Class: pottedplant	AP:	0.2406	-----
-----	Class: sheep	AP:	0.1740	-----
-----	Class: sofa	AP:	0.2549	-----
-----	Class: train	AP:	0.4669	-----
-----	Class: tvmonitor	AP:	0.2438	-----

mAP: 0.3453

Avg loss: 0.1825026772916317

Evaluating classifier

Mean Precision Score for Testing on Epoch 120 is 0.3453441653002205

Starting epoch number 121

Loss for Training on Epoch 121 is 0.1693238466978073

Starting epoch number 122

Loss for Training on Epoch 122 is 0.17154033482074738  
Starting epoch number 123

Loss for Training on Epoch 123 is 0.16940325498580933  
Starting epoch number 124

Loss for Training on Epoch 124 is 0.16830742359161377  
Starting epoch number 125

Loss for Training on Epoch 125 is 0.16792871057987213

----- Class: aeroplane	AP: 0.5998	-----
----- Class: bicycle	AP: 0.2039	-----
----- Class: bird	AP: 0.3121	-----
----- Class: boat	AP: 0.4352	-----
----- Class: bottle	AP: 0.1326	-----
----- Class: bus	AP: 0.2000	-----
----- Class: car	AP: 0.5770	-----
----- Class: cat	AP: 0.3835	-----
----- Class: chair	AP: 0.4325	-----
----- Class: cow	AP: 0.1295	-----
----- Class: diningtable	AP: 0.3543	-----
----- Class: dog	AP: 0.2853	-----
----- Class: horse	AP: 0.5074	-----
----- Class: motorbike	AP: 0.4926	-----
----- Class: person	AP: 0.8139	-----
----- Class: pottedplant	AP: 0.2387	-----
----- Class: sheep	AP: 0.1661	-----
----- Class: sofa	AP: 0.2634	-----
----- Class: train	AP: 0.4413	-----
----- Class: tvmonitor	AP: 0.2743	-----

mAP: 0.3622

Avg loss: 0.17744391597807407

Evaluating classifier

Mean Precision Score for Testing on Epoch 125 is 0.362183804656031

Starting epoch number 126

Loss for Training on Epoch 126 is 0.1678159087896347

Starting epoch number 127

Loss for Training on Epoch 127 is 0.16564182937145233

Starting epoch number 128

Loss for Training on Epoch 128 is 0.16519935429096222

Starting epoch number 129

Loss for Training on Epoch 129 is 0.16630160808563232

Starting epoch number 130

Loss for Training on Epoch 130 is 0.16546528041362762

----- Class: aeroplane	AP: 0.5520	-----
----- Class: bicycle	AP: 0.2333	-----
----- Class: bird	AP: 0.2862	-----
----- Class: boat	AP: 0.3336	-----

-----	Class: bottle	AP:	0.1307	-----
-----	Class: bus	AP:	0.0945	-----
-----	Class: car	AP:	0.5308	-----
-----	Class: cat	AP:	0.3685	-----
-----	Class: chair	AP:	0.4019	-----
-----	Class: cow	AP:	0.1232	-----
-----	Class: diningtable	AP:	0.2976	-----
-----	Class: dog	AP:	0.2661	-----
-----	Class: horse	AP:	0.4862	-----
-----	Class: motorbike	AP:	0.4795	-----
-----	Class: person	AP:	0.8038	-----
-----	Class: pottedplant	AP:	0.2139	-----
-----	Class: sheep	AP:	0.1812	-----
-----	Class: sofa	AP:	0.3102	-----
-----	Class: train	AP:	0.4051	-----
-----	Class: tvmonitor	AP:	0.1985	-----

mAP: 0.3348

Avg loss: 0.19440331533551217

Evaluating classifier

Mean Precision Score for Testing on Epoch 130 is 0.33484762165407755

Starting epoch number 131

Loss for Training on Epoch 131 is 0.16510438919067383

Starting epoch number 132

Loss for Training on Epoch 132 is 0.1636977642774582

Starting epoch number 133

Loss for Training on Epoch 133 is 0.16521911323070526

Starting epoch number 134

Loss for Training on Epoch 134 is 0.16420809924602509

Starting epoch number 135

Loss for Training on Epoch 135 is 0.1701192408800125

-----	Class: aeroplane	AP:	0.5566	-----
-----	Class: bicycle	AP:	0.2276	-----
-----	Class: bird	AP:	0.2752	-----
-----	Class: boat	AP:	0.3121	-----
-----	Class: bottle	AP:	0.1300	-----
-----	Class: bus	AP:	0.2188	-----
-----	Class: car	AP:	0.5305	-----
-----	Class: cat	AP:	0.3904	-----
-----	Class: chair	AP:	0.4284	-----
-----	Class: cow	AP:	0.1125	-----
-----	Class: diningtable	AP:	0.3464	-----
-----	Class: dog	AP:	0.2623	-----
-----	Class: horse	AP:	0.4595	-----
-----	Class: motorbike	AP:	0.3958	-----
-----	Class: person	AP:	0.7996	-----

-----	Class: pottedplant	AP:	0.2567	-----
-----	Class: sheep	AP:	0.1867	-----
-----	Class: sofa	AP:	0.2599	-----
-----	Class: train	AP:	0.5003	-----
-----	Class: tvmonitor	AP:	0.2592	-----

mAP: 0.3454

Avg loss: 0.183145272359252

Evaluating classifier

Mean Precision Score for Testing on Epoch 135 is 0.3454216232499371

Starting epoch number 136

Loss for Training on Epoch 136 is 0.16827239096164703

Starting epoch number 137

Loss for Training on Epoch 137 is 0.16446636617183685

Starting epoch number 138

Loss for Training on Epoch 138 is 0.16842412948608398

Starting epoch number 139

Loss for Training on Epoch 139 is 0.16441592574119568

Starting epoch number 140

Loss for Training on Epoch 140 is 0.1643056422472

-----	Class: aeroplane	AP:	0.5900	-----
-----	Class: bicycle	AP:	0.2601	-----
-----	Class: bird	AP:	0.2465	-----
-----	Class: boat	AP:	0.3753	-----
-----	Class: bottle	AP:	0.1343	-----
-----	Class: bus	AP:	0.2070	-----
-----	Class: car	AP:	0.5420	-----
-----	Class: cat	AP:	0.3882	-----
-----	Class: chair	AP:	0.4313	-----
-----	Class: cow	AP:	0.1306	-----
-----	Class: diningtable	AP:	0.3244	-----
-----	Class: dog	AP:	0.2824	-----
-----	Class: horse	AP:	0.4780	-----
-----	Class: motorbike	AP:	0.4285	-----
-----	Class: person	AP:	0.8060	-----
-----	Class: pottedplant	AP:	0.2411	-----
-----	Class: sheep	AP:	0.1692	-----
-----	Class: sofa	AP:	0.2408	-----
-----	Class: train	AP:	0.5042	-----
-----	Class: tvmonitor	AP:	0.2890	-----

mAP: 0.3534

Avg loss: 0.18152074962854386

Evaluating classifier

Mean Precision Score for Testing on Epoch 140 is 0.35343823667814894

Starting epoch number 141

Loss for Training on Epoch 141 is 0.15682008862495422

```
Starting epoch number 142
Loss for Training on Epoch 142 is 0.16553859412670135
Starting epoch number 143
Loss for Training on Epoch 143 is 0.17337201535701752
Starting epoch number 144
Loss for Training on Epoch 144 is 0.16436628997325897
Starting epoch number 145
Loss for Training on Epoch 145 is 0.1634150743484497
----- Class: aeroplane      AP:  0.5639  -----
----- Class: bicycle        AP:  0.2236  -----
----- Class: bird           AP:  0.2484  -----
----- Class: boat           AP:  0.4128  -----
----- Class: bottle         AP:  0.1224  -----
----- Class: bus            AP:  0.2011  -----
----- Class: car            AP:  0.5303  -----
----- Class: cat            AP:  0.3963  -----
----- Class: chair          AP:  0.4107  -----
----- Class: cow            AP:  0.1107  -----
----- Class: diningtable    AP:  0.3134  -----
----- Class: dog            AP:  0.3084  -----
----- Class: horse          AP:  0.4528  -----
----- Class: motorbike      AP:  0.4250  -----
----- Class: person         AP:  0.7967  -----
----- Class: pottedplant    AP:  0.2546  -----
----- Class: sheep          AP:  0.1593  -----
----- Class: sofa           AP:  0.2546  -----
----- Class: train          AP:  0.5044  -----
----- Class: tvmonitor      AP:  0.2584  -----
mAP: 0.3474
Avg loss: 0.18367352802306414
Evaluating classifier
Mean Precision Score for Testing on Epoch 145 is 0.3473841355856161
Starting epoch number 146
Loss for Training on Epoch 146 is 0.16451644897460938
Starting epoch number 147
Loss for Training on Epoch 147 is 0.16037076711654663
Starting epoch number 148
Loss for Training on Epoch 148 is 0.16059236228466034
Starting epoch number 149
Loss for Training on Epoch 149 is 0.1613425463438034
Starting epoch number 150
Loss for Training on Epoch 150 is 0.16157834231853485
----- Class: aeroplane      AP:  0.6035  -----
----- Class: bicycle        AP:  0.2994  -----
----- Class: bird           AP:  0.2751  -----
```



-----	Class: boat	AP:	0.4006	-----
-----	Class: bottle	AP:	0.1302	-----
-----	Class: bus	AP:	0.1928	-----
-----	Class: car	AP:	0.5404	-----
-----	Class: cat	AP:	0.3898	-----
-----	Class: chair	AP:	0.4390	-----
-----	Class: cow	AP:	0.1197	-----
-----	Class: diningtable	AP:	0.4068	-----
-----	Class: dog	AP:	0.2895	-----
-----	Class: horse	AP:	0.5006	-----
-----	Class: motorbike	AP:	0.4327	-----
-----	Class: person	AP:	0.8064	-----
-----	Class: pottedplant	AP:	0.2572	-----
-----	Class: sheep	AP:	0.1583	-----
-----	Class: sofa	AP:	0.2994	-----
-----	Class: train	AP:	0.5393	-----
-----	Class: tvmonitor	AP:	0.2946	-----

mAP: 0.3688

Avg loss: 0.18335101157426834

Evaluating classifier

Mean Precision Score for Testing on Epoch 150 is 0.3687743392887937

Starting epoch number 151

Loss for Training on Epoch 151 is 0.16063402593135834

Starting epoch number 152

Loss for Training on Epoch 152 is 0.15972664952278137

Starting epoch number 153

Loss for Training on Epoch 153 is 0.1582740694284439

Starting epoch number 154

Loss for Training on Epoch 154 is 0.16014015674591064

Starting epoch number 155

Loss for Training on Epoch 155 is 0.15677765011787415

-----	Class: aeroplane	AP:	0.5875	-----
-----	Class: bicycle	AP:	0.2662	-----
-----	Class: bird	AP:	0.2950	-----
-----	Class: boat	AP:	0.3699	-----
-----	Class: bottle	AP:	0.1224	-----
-----	Class: bus	AP:	0.2297	-----
-----	Class: car	AP:	0.5380	-----
-----	Class: cat	AP:	0.3994	-----
-----	Class: chair	AP:	0.3873	-----
-----	Class: cow	AP:	0.1284	-----
-----	Class: diningtable	AP:	0.3183	-----
-----	Class: dog	AP:	0.3076	-----
-----	Class: horse	AP:	0.4934	-----
-----	Class: motorbike	AP:	0.4834	-----

-----	Class: person	AP:	0.8081	-----
-----	Class: pottedplant	AP:	0.2287	-----
-----	Class: sheep	AP:	0.2399	-----
-----	Class: sofa	AP:	0.2243	-----
-----	Class: train	AP:	0.5091	-----
-----	Class: tvmonitor	AP:	0.2576	-----

mAP: 0.3597

Avg loss: 0.18227510005235673

Evaluating classifier

Mean Precision Score for Testing on Epoch 155 is 0.35971034209360764

Starting epoch number 156

Loss for Training on Epoch 156 is 0.16076767444610596

Starting epoch number 157

Loss for Training on Epoch 157 is 0.15952537953853607

Starting epoch number 158

Loss for Training on Epoch 158 is 0.15809772908687592

Starting epoch number 159

Loss for Training on Epoch 159 is 0.157727912068367

Starting epoch number 160

Loss for Training on Epoch 160 is 0.15684886276721954

-----	Class: aeroplane	AP:	0.5819	-----
-----	Class: bicycle	AP:	0.1373	-----
-----	Class: bird	AP:	0.2834	-----
-----	Class: boat	AP:	0.3583	-----
-----	Class: bottle	AP:	0.1100	-----
-----	Class: bus	AP:	0.1117	-----
-----	Class: car	AP:	0.5082	-----
-----	Class: cat	AP:	0.4148	-----
-----	Class: chair	AP:	0.3818	-----
-----	Class: cow	AP:	0.1387	-----
-----	Class: diningtable	AP:	0.2566	-----
-----	Class: dog	AP:	0.2700	-----
-----	Class: horse	AP:	0.4515	-----
-----	Class: motorbike	AP:	0.3913	-----
-----	Class: person	AP:	0.8117	-----
-----	Class: pottedplant	AP:	0.1844	-----
-----	Class: sheep	AP:	0.2106	-----
-----	Class: sofa	AP:	0.2973	-----
-----	Class: train	AP:	0.4298	-----
-----	Class: tvmonitor	AP:	0.2192	-----

mAP: 0.3274

Avg loss: 0.20858504213392734

Evaluating classifier

Mean Precision Score for Testing on Epoch 160 is 0.3274262468014466

Starting epoch number 161

Loss for Training on Epoch 161 is 0.1583787053823471  
Starting epoch number 162  
Loss for Training on Epoch 162 is 0.15887244045734406  
Starting epoch number 163  
Loss for Training on Epoch 163 is 0.15844856202602386  
Starting epoch number 164  
Loss for Training on Epoch 164 is 0.15762220323085785  
Starting epoch number 165  
Loss for Training on Epoch 165 is 0.1588592380285263

----- Class: aeroplane	AP: 0.6105	-----
----- Class: bicycle	AP: 0.2526	-----
----- Class: bird	AP: 0.3815	-----
----- Class: boat	AP: 0.3630	-----
----- Class: bottle	AP: 0.1327	-----
----- Class: bus	AP: 0.2321	-----
----- Class: car	AP: 0.5458	-----
----- Class: cat	AP: 0.4190	-----
----- Class: chair	AP: 0.3954	-----
----- Class: cow	AP: 0.1169	-----
----- Class: diningtable	AP: 0.2838	-----
----- Class: dog	AP: 0.3148	-----
----- Class: horse	AP: 0.5192	-----
----- Class: motorbike	AP: 0.5093	-----
----- Class: person	AP: 0.8256	-----
----- Class: pottedplant	AP: 0.2200	-----
----- Class: sheep	AP: 0.1527	-----
----- Class: sofa	AP: 0.2565	-----
----- Class: train	AP: 0.5319	-----
----- Class: tvmonitor	AP: 0.2879	-----

mAP: 0.3676

Avg loss: 0.17789799422025682

Evaluating classifier

Mean Precision Score for Testing on Epoch 165 is 0.3675601126211091

Starting epoch number 166

Loss for Training on Epoch 166 is 0.15323160588741302

Starting epoch number 167

Loss for Training on Epoch 167 is 0.15500488877296448

Starting epoch number 168

Loss for Training on Epoch 168 is 0.15703168511390686

Starting epoch number 169

Loss for Training on Epoch 169 is 0.1551024168729782

Starting epoch number 170

Loss for Training on Epoch 170 is 0.15459147095680237

----- Class: aeroplane	AP: 0.5925	-----
----- Class: bicycle	AP: 0.2800	-----

-----	Class: bird	AP:	0.3377	-----
-----	Class: boat	AP:	0.3724	-----
-----	Class: bottle	AP:	0.1317	-----
-----	Class: bus	AP:	0.1757	-----
-----	Class: car	AP:	0.5791	-----
-----	Class: cat	AP:	0.4043	-----
-----	Class: chair	AP:	0.4389	-----
-----	Class: cow	AP:	0.1357	-----
-----	Class: diningtable	AP:	0.3309	-----
-----	Class: dog	AP:	0.2950	-----
-----	Class: horse	AP:	0.5353	-----
-----	Class: motorbike	AP:	0.4653	-----
-----	Class: person	AP:	0.8180	-----
-----	Class: pottedplant	AP:	0.2435	-----
-----	Class: sheep	AP:	0.1733	-----
-----	Class: sofa	AP:	0.2759	-----
-----	Class: train	AP:	0.4582	-----
-----	Class: tvmonitor	AP:	0.2985	-----

mAP: 0.3671

Avg loss: 0.1785883843898773

Evaluating classifier

Mean Precision Score for Testing on Epoch 170 is 0.36709858358268643

Starting epoch number 171

Loss for Training on Epoch 171 is 0.15407364070415497

Starting epoch number 172

Loss for Training on Epoch 172 is 0.15238188207149506

Starting epoch number 173

Loss for Training on Epoch 173 is 0.15218155086040497

Starting epoch number 174

Loss for Training on Epoch 174 is 0.1534423530101776

Starting epoch number 175

Loss for Training on Epoch 175 is 0.15309999883174896

-----	Class: aeroplane	AP:	0.5728	-----
-----	Class: bicycle	AP:	0.2684	-----
-----	Class: bird	AP:	0.3117	-----
-----	Class: boat	AP:	0.4193	-----
-----	Class: bottle	AP:	0.1462	-----
-----	Class: bus	AP:	0.2678	-----
-----	Class: car	AP:	0.5728	-----
-----	Class: cat	AP:	0.4360	-----
-----	Class: chair	AP:	0.4482	-----
-----	Class: cow	AP:	0.1550	-----
-----	Class: diningtable	AP:	0.3556	-----
-----	Class: dog	AP:	0.2818	-----
-----	Class: horse	AP:	0.5530	-----

----- Class: motorbike	AP: 0.4770	-----
----- Class: person	AP: 0.8136	-----
----- Class: pottedplant	AP: 0.2540	-----
----- Class: sheep	AP: 0.1975	-----
----- Class: sofa	AP: 0.2633	-----
----- Class: train	AP: 0.5421	-----
----- Class: tvmonitor	AP: 0.2730	-----

mAP: 0.3805

Avg loss: 0.17756865732371807

Evaluating classifier

Mean Precision Score for Testing on Epoch 175 is 0.3804563533470589

Starting epoch number 176

Loss for Training on Epoch 176 is 0.15598659217357635

Starting epoch number 177

Loss for Training on Epoch 177 is 0.15342698991298676

Starting epoch number 178

Loss for Training on Epoch 178 is 0.15269844233989716

Starting epoch number 179

Loss for Training on Epoch 179 is 0.1516408622264862

Starting epoch number 180

Loss for Training on Epoch 180 is 0.15200011432170868

----- Class: aeroplane	AP: 0.5668	-----
----- Class: bicycle	AP: 0.2893	-----
----- Class: bird	AP: 0.3104	-----
----- Class: boat	AP: 0.4051	-----
----- Class: bottle	AP: 0.1540	-----
----- Class: bus	AP: 0.2311	-----
----- Class: car	AP: 0.5444	-----
----- Class: cat	AP: 0.4263	-----
----- Class: chair	AP: 0.4250	-----
----- Class: cow	AP: 0.1354	-----
----- Class: diningtable	AP: 0.3342	-----
----- Class: dog	AP: 0.3158	-----
----- Class: horse	AP: 0.5396	-----
----- Class: motorbike	AP: 0.4361	-----
----- Class: person	AP: 0.8165	-----
----- Class: pottedplant	AP: 0.2224	-----
----- Class: sheep	AP: 0.1799	-----
----- Class: sofa	AP: 0.2636	-----
----- Class: train	AP: 0.5449	-----
----- Class: tvmonitor	AP: 0.2930	-----

mAP: 0.3717

Avg loss: 0.18338727951049805

Evaluating classifier

Mean Precision Score for Testing on Epoch 180 is 0.3716797350756632

```
Starting epoch number 181
Loss for Training on Epoch 181 is 0.15268054604530334
Starting epoch number 182
Loss for Training on Epoch 182 is 0.15191595256328583
Starting epoch number 183
Loss for Training on Epoch 183 is 0.15603779256343842
Starting epoch number 184
Loss for Training on Epoch 184 is 0.14928598701953888
Starting epoch number 185
Loss for Training on Epoch 185 is 0.15176443755626678
----- Class: aeroplane          AP: 0.5614 -----
----- Class: bicycle            AP: 0.3607 -----
----- Class: bird                AP: 0.3400 -----
----- Class: boat                AP: 0.4011 -----
----- Class: bottle              AP: 0.1509 -----
----- Class: bus                  AP: 0.1711 -----
----- Class: car                  AP: 0.5895 -----
----- Class: cat                  AP: 0.4270 -----
----- Class: chair                AP: 0.4346 -----
----- Class: cow                  AP: 0.1354 -----
----- Class: diningtable          AP: 0.3515 -----
----- Class: dog                  AP: 0.3051 -----
----- Class: horse                AP: 0.5685 -----
----- Class: motorbike            AP: 0.5078 -----
----- Class: person                AP: 0.8277 -----
----- Class: pottedplant          AP: 0.2504 -----
----- Class: sheep                AP: 0.2011 -----
----- Class: sofa                  AP: 0.2699 -----
----- Class: train                AP: 0.5539 -----
----- Class: tvmonitor            AP: 0.2899 -----
mAP: 0.3849
Avg loss: 0.17690984718501568
Evaluating classifier
Mean Precision Score for Testing on Epoch 185 is 0.384879584963702
Starting epoch number 186
Loss for Training on Epoch 186 is 0.15180732309818268
Starting epoch number 187
Loss for Training on Epoch 187 is 0.14852376282215118
Starting epoch number 188
Loss for Training on Epoch 188 is 0.14641207456588745
Starting epoch number 189
Loss for Training on Epoch 189 is 0.14880183339118958
Starting epoch number 190
Loss for Training on Epoch 190 is 0.15026171505451202
----- Class: aeroplane          AP: 0.6125 -----
```

-----	Class: bicycle	AP:	0.3260	-----
-----	Class: bird	AP:	0.3382	-----
-----	Class: boat	AP:	0.3657	-----
-----	Class: bottle	AP:	0.1315	-----
-----	Class: bus	AP:	0.2427	-----
-----	Class: car	AP:	0.5972	-----
-----	Class: cat	AP:	0.4223	-----
-----	Class: chair	AP:	0.4332	-----
-----	Class: cow	AP:	0.1463	-----
-----	Class: diningtable	AP:	0.3641	-----
-----	Class: dog	AP:	0.2903	-----
-----	Class: horse	AP:	0.5645	-----
-----	Class: motorbike	AP:	0.5092	-----
-----	Class: person	AP:	0.8291	-----
-----	Class: pottedplant	AP:	0.2318	-----
-----	Class: sheep	AP:	0.2217	-----
-----	Class: sofa	AP:	0.3199	-----
-----	Class: train	AP:	0.5170	-----
-----	Class: tvmonitor	AP:	0.3047	-----

mAP: 0.3884

Avg loss: 0.17766526117920875

Evaluating classifier

Mean Precision Score for Testing on Epoch 190 is 0.3883987343717693

Starting epoch number 191

Loss for Training on Epoch 191 is 0.1484549343585968

Starting epoch number 192

Loss for Training on Epoch 192 is 0.15071919560432434

Starting epoch number 193

Loss for Training on Epoch 193 is 0.14894194900989532

Starting epoch number 194

Loss for Training on Epoch 194 is 0.14534126222133636

Starting epoch number 195

Loss for Training on Epoch 195 is 0.14455072581768036

-----	Class: aeroplane	AP:	0.6034	-----
-----	Class: bicycle	AP:	0.2737	-----
-----	Class: bird	AP:	0.3391	-----
-----	Class: boat	AP:	0.3460	-----
-----	Class: bottle	AP:	0.1430	-----
-----	Class: bus	AP:	0.2079	-----
-----	Class: car	AP:	0.5896	-----
-----	Class: cat	AP:	0.3759	-----
-----	Class: chair	AP:	0.4352	-----
-----	Class: cow	AP:	0.1232	-----
-----	Class: diningtable	AP:	0.3644	-----
-----	Class: dog	AP:	0.1985	-----

-----	Class: horse	AP:	0.5324	-----
-----	Class: motorbike	AP:	0.5361	-----
-----	Class: person	AP:	0.8146	-----
-----	Class: pottedplant	AP:	0.2858	-----
-----	Class: sheep	AP:	0.1401	-----
-----	Class: sofa	AP:	0.2652	-----
-----	Class: train	AP:	0.5281	-----
-----	Class: tvmonitor	AP:	0.3129	-----

mAP: 0.3708

Avg loss: 0.19278214871883392

Evaluating classifier

Mean Precision Score for Testing on Epoch 195 is 0.37075961040454175

Starting epoch number 196

Loss for Training on Epoch 196 is 0.14641107618808746

Starting epoch number 197

Loss for Training on Epoch 197 is 0.1468696892261505

Starting epoch number 198

Loss for Training on Epoch 198 is 0.14727269113063812

Starting epoch number 199

Loss for Training on Epoch 199 is 0.14972154796123505

Starting epoch number 200

Loss for Training on Epoch 200 is 0.14986518025398254

-----	Class: aeroplane	AP:	0.6158	-----
-----	Class: bicycle	AP:	0.2542	-----
-----	Class: bird	AP:	0.2914	-----
-----	Class: boat	AP:	0.3341	-----
-----	Class: bottle	AP:	0.1479	-----
-----	Class: bus	AP:	0.2037	-----
-----	Class: car	AP:	0.5788	-----
-----	Class: cat	AP:	0.3862	-----
-----	Class: chair	AP:	0.3917	-----
-----	Class: cow	AP:	0.1468	-----
-----	Class: diningtable	AP:	0.3689	-----
-----	Class: dog	AP:	0.2750	-----
-----	Class: horse	AP:	0.5540	-----
-----	Class: motorbike	AP:	0.4938	-----
-----	Class: person	AP:	0.8035	-----
-----	Class: pottedplant	AP:	0.2604	-----
-----	Class: sheep	AP:	0.1764	-----
-----	Class: sofa	AP:	0.2444	-----
-----	Class: train	AP:	0.5453	-----
-----	Class: tvmonitor	AP:	0.2603	-----

mAP: 0.3666

Avg loss: 0.18358068577945233

Evaluating classifier



```
Mean Precision Score for Testing on Epoch 200 is 0.36663439457080055
Starting epoch number 201
Loss for Training on Epoch 201 is 0.14543691277503967
Starting epoch number 202
Loss for Training on Epoch 202 is 0.14362691342830658
Starting epoch number 203
Loss for Training on Epoch 203 is 0.14487028121948242
Starting epoch number 204
Loss for Training on Epoch 204 is 0.14277638494968414
Starting epoch number 205
Loss for Training on Epoch 205 is 0.15497660636901855
----- Class: aeroplane      AP:   0.5765 -----
----- Class: bicycle        AP:   0.2644 -----
----- Class: bird           AP:   0.2948 -----
----- Class: boat           AP:   0.3764 -----
----- Class: bottle         AP:   0.1415 -----
----- Class: bus            AP:   0.1851 -----
----- Class: car            AP:   0.4727 -----
----- Class: cat            AP:   0.3677 -----
----- Class: chair          AP:   0.4212 -----
----- Class: cow            AP:   0.1094 -----
----- Class: diningtable    AP:   0.3562 -----
----- Class: dog            AP:   0.2811 -----
----- Class: horse          AP:   0.4554 -----
----- Class: motorbike      AP:   0.4031 -----
----- Class: person         AP:   0.8156 -----
----- Class: pottedplant    AP:   0.2586 -----
----- Class: sheep          AP:   0.1855 -----
----- Class: sofa           AP:   0.3255 -----
----- Class: train          AP:   0.4467 -----
----- Class: tvmonitor      AP:   0.3122 -----
mAP: 0.3525
Avg loss: 0.19844211861491204
Evaluating classifier
Mean Precision Score for Testing on Epoch 205 is 0.3524730663943089
Starting epoch number 206
Loss for Training on Epoch 206 is 0.14937587082386017
Starting epoch number 207
Loss for Training on Epoch 207 is 0.1458328515291214
Starting epoch number 208
Loss for Training on Epoch 208 is 0.14729247987270355
Starting epoch number 209
Loss for Training on Epoch 209 is 0.14472384750843048
Starting epoch number 210
Loss for Training on Epoch 210 is 0.14357614517211914
```

-----	Class: aeroplane	AP:	0.6205	-----
-----	Class: bicycle	AP:	0.2795	-----
-----	Class: bird	AP:	0.3051	-----
-----	Class: boat	AP:	0.4012	-----
-----	Class: bottle	AP:	0.1453	-----
-----	Class: bus	AP:	0.1528	-----
-----	Class: car	AP:	0.5649	-----
-----	Class: cat	AP:	0.4520	-----
-----	Class: chair	AP:	0.4090	-----
-----	Class: cow	AP:	0.1502	-----
-----	Class: diningtable	AP:	0.3463	-----
-----	Class: dog	AP:	0.2741	-----
-----	Class: horse	AP:	0.5405	-----
-----	Class: motorbike	AP:	0.5037	-----
-----	Class: person	AP:	0.8253	-----
-----	Class: pottedplant	AP:	0.2360	-----
-----	Class: sheep	AP:	0.2033	-----
-----	Class: sofa	AP:	0.3091	-----
-----	Class: train	AP:	0.4455	-----
-----	Class: tvmonitor	AP:	0.2896	-----

mAP: 0.3727

Avg loss: 0.1941513516008854

Evaluating classifier

Mean Precision Score for Testing on Epoch 210 is 0.37268310616018036

Starting epoch number 211

Loss for Training on Epoch 211 is 0.14327089488506317

Starting epoch number 212

Loss for Training on Epoch 212 is 0.14951078593730927

Starting epoch number 213

Loss for Training on Epoch 213 is 0.14304617047309875

Starting epoch number 214

Loss for Training on Epoch 214 is 0.14175565540790558

Starting epoch number 215

Loss for Training on Epoch 215 is 0.14143195748329163

-----	Class: aeroplane	AP:	0.5807	-----
-----	Class: bicycle	AP:	0.2681	-----
-----	Class: bird	AP:	0.2805	-----
-----	Class: boat	AP:	0.4387	-----
-----	Class: bottle	AP:	0.1398	-----
-----	Class: bus	AP:	0.2200	-----
-----	Class: car	AP:	0.5805	-----
-----	Class: cat	AP:	0.4265	-----
-----	Class: chair	AP:	0.4195	-----
-----	Class: cow	AP:	0.1469	-----
-----	Class: diningtable	AP:	0.3363	-----

-----	Class: dog	AP:	0.3118	-----
-----	Class: horse	AP:	0.5217	-----
-----	Class: motorbike	AP:	0.5132	-----
-----	Class: person	AP:	0.8226	-----
-----	Class: pottedplant	AP:	0.2586	-----
-----	Class: sheep	AP:	0.1862	-----
-----	Class: sofa	AP:	0.2837	-----
-----	Class: train	AP:	0.5227	-----
-----	Class: tvmonitor	AP:	0.3148	-----

mAP: 0.3786

Avg loss: 0.19037353247404099

Evaluating classifier

Mean Precision Score for Testing on Epoch 215 is 0.3786491200104951

Starting epoch number 216

Loss for Training on Epoch 216 is 0.1430961787700653

Starting epoch number 217

Loss for Training on Epoch 217 is 0.1412310153245926

Starting epoch number 218

Loss for Training on Epoch 218 is 0.13530686497688293

Starting epoch number 219

Loss for Training on Epoch 219 is 0.1404377967119217

Starting epoch number 220

Loss for Training on Epoch 220 is 0.13960568606853485

-----	Class: aeroplane	AP:	0.5790	-----
-----	Class: bicycle	AP:	0.2837	-----
-----	Class: bird	AP:	0.2872	-----
-----	Class: boat	AP:	0.4435	-----
-----	Class: bottle	AP:	0.1513	-----
-----	Class: bus	AP:	0.1898	-----
-----	Class: car	AP:	0.5992	-----
-----	Class: cat	AP:	0.4628	-----
-----	Class: chair	AP:	0.4329	-----
-----	Class: cow	AP:	0.1480	-----
-----	Class: diningtable	AP:	0.3542	-----
-----	Class: dog	AP:	0.3156	-----
-----	Class: horse	AP:	0.5461	-----
-----	Class: motorbike	AP:	0.5184	-----
-----	Class: person	AP:	0.8295	-----
-----	Class: pottedplant	AP:	0.2436	-----
-----	Class: sheep	AP:	0.2154	-----
-----	Class: sofa	AP:	0.3141	-----
-----	Class: train	AP:	0.4992	-----
-----	Class: tvmonitor	AP:	0.3141	-----

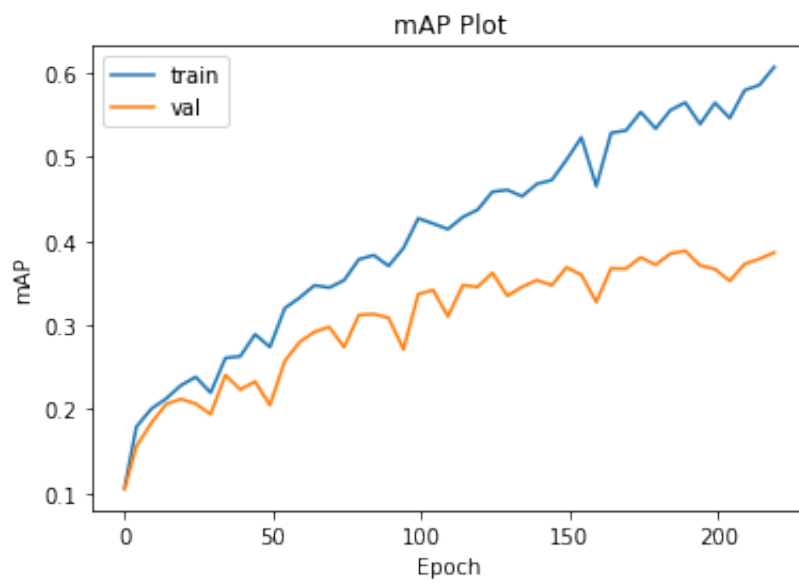
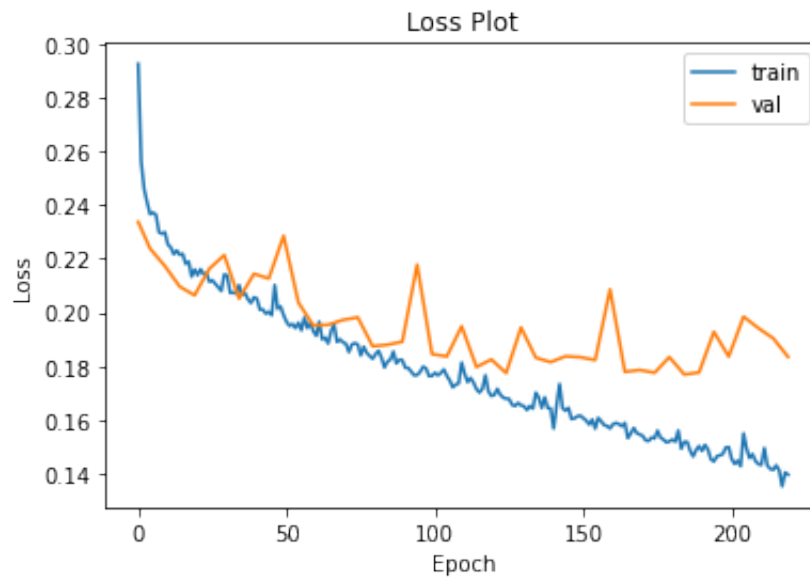
mAP: 0.3864

Avg loss: 0.18345072902739049

Evaluating classifier

Mean Precision Score for Testing on Epoch 220 is 0.38638158935276246

```
plot_losses(train_losses, val_losses, test_frequency, num_epochs)
plot_mAP(train_mAPs, val_mAPs, test_frequency, num_epochs)
```



```
mAP_test, test_loss, test_aps = test_classifier(test_loader, classifier, cr
print(mAP_test)
```

-----	Class: aeroplane	AP:	0.5421	-----
-----	Class: bicycle	AP:	0.3113	-----
-----	Class: bird	AP:	0.3541	-----
-----	Class: boat	AP:	0.3647	-----
-----	Class: bottle	AP:	0.1705	-----
-----	Class: bus	AP:	0.1953	-----
-----	Class: car	AP:	0.6274	-----
-----	Class: cat	AP:	0.4384	-----
-----	Class: chair	AP:	0.4212	-----
-----	Class: cow	AP:	0.1968	-----
-----	Class: diningtable	AP:	0.2967	-----
-----	Class: dog	AP:	0.3794	-----
-----	Class: horse	AP:	0.6706	-----
-----	Class: motorbike	AP:	0.5364	-----
-----	Class: person	AP:	0.8533	-----
-----	Class: pottedplant	AP:	0.2518	-----
-----	Class: sheep	AP:	0.2381	-----
-----	Class: sofa	AP:	0.2573	-----
-----	Class: train	AP:	0.4620	-----
-----	Class: tvmonitor	AP:	0.2755	-----

mAP: 0.3922

Avg loss: 0.1803646880464676

0.39215158683089213

```
torch.save(classifier.state_dict(), './voc_my_best_classifier.pth')  
output_submission_csv('my_solution.csv', test_aps)
```