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## Part-1

**I have used Main.py to train the model.**

Did you upload final CSV file on Kaggle: **No (for part 1)**

1. My best mAP on Kaggle: my score on camel is 0.27499, However this is not my best result. I have attached the out.txt which is my best mAP.
2. Factors which helped improve my model
    a. Data augmentation by
        - transforms.RandomResizedCrop(180, scale=(0.5, 1.0)
        - transforms.RandomHorizontalFlip
        - transforms.RandomVerticalFlip
    b. Adding NB layer after All convolutions and fully connected layers
    c. Adam instead of SGD
    d. Learning rate 0.0001
    e. 50 epochs
3. Table for final architecture:

| Layer No. | Layer Type | Kernel size (for conv layers) | Input \| Output dimension | Input \| Output Channels (for conv layers) |
|---|---|---|---|---|
| 1 | conv2d | 3 | 227 \| 225 | 3 \| 128 |
| 2 | BatchNorm2d | - | 225 \| 225 | |
| 3 | relu | - | 225 \| 225 | - |
| 4 | conv2d | 3 | 225 \| 223 | 128 \| 64 |
| 5 | BatchNorm2d | | 223 \| 223 | |
| 6 | relu | - | 223 \| 223 | - |
| 7 | maxpool2d | 2 | 223 \| 111 | - |
| 8 | conv2d | 3 | 111 \|109 | 64 \| 32 |
| 9 | BatchNorm2d | - | 109 \| 109 | |
| 10 | relu | - | 109 \| 109 | - |
| 11 | maxpool2d | 2 | 54 \| 54 | - |
| 12 | conv2d | 3 | 54 \|52 | 32 \| 16 |
| 13 | BatchNorm2d | - | 52 \| 52 | |
| 14 | relu | - | 52 \| 52 | - |
| 15 | maxpool2d | 2 | 52 \| 26 | - |
| 16 | linear | - | 10816\| 120 | 16 \| 1 |

| | | | | |
|---|---|---|---|---|
| 17 | BatchNorm1d | - | 120 \| 120 | |
| 18 | relu | - | 120 \| 120 | - |
| 19 | linear | - | 120 \| 84 | - |
| 20 | BatchNorm1d | - | 84 \| 84 | |
| 21 | relu | - | 84 \| 84 | - |
| 22 | linear | - | 84 \| 21 | - |

The initial network provided to you can be considered as the BaseNet. A very important part of deep learning is understanding the ablation studies of various networks. So we would like you to do a few experiments. Note, this **doesn't need to be very exhaustive** and can be in a cumulative manner in an order you might prefer. Fill in the following table :

| Serial # | Model architecture | Best mAP on test set |
|---|---|---|
| **1** | BaseNet + SGD + (lr = 0.001) + ep 25 | 0.0887 |
| **2** | BaseNet+Adam+ (lr = 0.001) + ep 30 | 0.22 |
| 3 | BaseNet + conv+ Adam + BN + (lr = 0.0001) + ep 30 | 0.1844 |
| 4 | BaseNet + Conv + BN + (lr = 0.001) + ep 30 | 0.2661 |
| 5 | BaseNet + Conv + BN + (lr = 0.001) + ep 50 | 0.3069 |

## Part-2

**I have used Main.py to train the model.**

1. My best mAP value on Kaggle : my score on Kaggle 0.44085 ( mAP on the result file 0.559141554)
2. Did you upload final CSV file on Kaggle : Yes
3. My final loss value : 2.4353
4. What did not work in my code(if anything):
   UserWarning: indexing with dtype torch.uint8 is now deprecated, please use a dtype torch.bool instead.
5. Sample Images from my detector  from PASCAL VOC:


person0.16
person0.42
person0.43
person0.16


motorbike0.17
DUCATI
MWF
061


sofa0.15
FS-29