

Assignment 5 - Part 2

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Methodology

I tried **transfer learning** using resnet18, resnet50, resnet101, resnet152, efficient net-b8, and efficient net-b7.

In the end, I got the best F1 score using Resnet50.

Steps followed

- Used pre-trained model and added fc layers after it.
- Train the end layers with our data keeping the pre-trained model weights frozen.

Pre-processing

Preprocess according to the inputs required for resnet/ efficientnet.

1. Resize the image to 256x256
2. Center crop to extract a 224x224 image
3. Normalize the image by dividing by 255
4. Then RGB image is normalized using the means = [0.485, 0.456, 0.406] and standard deviations = [0.229, 0.224, 0.225]

Model Architecture

Last 3 layers inserted after Resnet50.

```
self.end_layers = nn.Sequential(
    nn.Linear(in_features = 1000, out_features = 700, bias = True),
    nn.ReLU(inplace=True),
    nn.Dropout(0.2),
    nn.Linear(in_features = 700, out_features = 300, bias = True),
    nn.ReLU(inplace=True),
    nn.Dropout(0.2),
    nn.Linear(in_features = 300, out_features = 100, bias = True),
    nn.ReLU(inplace=True),
    nn.Dropout(0.1),
    nn.Linear(in_features = 100, out_features = len(numClasses), bias = True)
)
```

HyperParameter Tuning

1. Tried various augmentations like random flipping, color jitter, affine transforms, grayscale, etc.
2. Scheduled learning rate decay with $\beta = 0.01$.
3. Tuned various hyper-parameters like learning rate, optimizer.
4. Experimented with various layers and methodologies to get the best results.
5. Added dropouts/ conv layers, increased fc layers, changed activation functions etc.

Hyperparameters used

Epochs = 50

Optimizer = Adam

Loss function = CrossEntropyLoss

Batch size = 512

AiCrowd f1 score 0.564

Other Methodologies Tried

Unfreeze the pre-trained model weights and train them to end replacing the last layer with the output number of my classes.

This gave me the F1 score in 0.48 range.